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FROM

The Board.

State of Connecticut
PUBLIC DOCUMENT No. 18

FORTY-SECOND ANNUAL REPORT
OF THE
SECRETARY
OF THE
Connecticut Board of Agriculture
1909

PRINTED BY ORDER OF THE LEGISLATURE

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1910

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The Roads.

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APPROVED BY

THE BOARD OF CONTROL.



PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.

HIS EXCELLENCY

FRANK B. WEEKS,

Governor of Connecticut.

Sir:—

In accordance with the provisions of an act creating the State Board of Agriculture, I have the honor to submit herewith the Report for the year ending December 31, 1909.

Very truly yours,

IVERSON C. FANTON,

Secretary.

WESTPORT, Dec. 31, 1909.

STATE BOARD OF AGRICULTURE.

1909.

HIS EXCELLENCY FRANK B. WEEKS, *ex officio*.

MEMBERS APPOINTED BY THE GOVERNOR AND SENATE.

		Term expires
WILSON H. LEE,	Orange,	July 1, 1911
IVERSON C. FANTON,	Weston,	July 1, 1911
GEORGE A. COSGROVE,	Willington,	July 1, 1913
LEONARD H. HEALEY,	North Woodstock,	July 1, 1913

APPOINTED BY THE GENERAL ASSEMBLY.

Hartford County,	N. HOWARD BREWER, Hockanum,	1913
New Haven County,	D. WALTER PATTEN, North Haven,	1913
New London County,	JAMES B. PALMER, Norwich,	1913
Fairfield County,	GEORGE A. BARNES, Sherman,	1913
Windham County,	EVERETT E. BROWN, Pomfret,	1911
Litchfield County,	BURTON C. PATTERSON, Torrington,	1911
Middlesex County,	WILBUR L. DAVIS, Durham,	1911
Tolland County,	CHAS. A. THOMPSON, Melrose,	1911

OFFICERS OF THE BOARD.

GOVERNOR FRANK B. WEEKS, *President ex officio*.

WILSON H. LEE,	Orange,	<i>Vice-President.</i>
I. C. FANTON,	Westport,	<i>Secretary.</i>
CHAS. A. THOMPSON,	Melrose,	<i>Treasurer.</i>
Dr. E. H. JENKINS,	New Haven,	<i>Chemist.</i>
Dr. G. P. CLINTON,	New Haven,	<i>Botanist.</i>
Dr. W. E. BRITTON,	New Haven,	<i>Entomologist.</i>
N. S. PLATT,	New Haven,	<i>Pomologist.</i>

Auditors.

JAMES B. PALMER, D. WALTER PATTEN, GEO. A. BARNES.

State of Connecticut.

BOARD OF AGRICULTURE.

WHEREAS: Col. James F. Brown of North Stonington has been connected with the State Board of Agriculture since 1895, with the exception of two years, and as he showed himself in the services of his Country in the Civil War to be a leader of men, a man of exceptional ability and judgment, in like manner as a Member of this Board, and since 1901 as its Secretary, he has shown himself to be a man among men, whose efficiency has been unquestioned, a gentleman in any capacity he has ever been placed. Therefore be it

Resolved: That we highly appreciate his services, both as a Member of the Board and as its Secretary also. The dignity and gentlemanly bearing with which he has always conducted his part of the work. Our associations together have been so pleasant and peaceful, we can hardly realize that they are about to end, but we trust peace and prosperity may attend Col. Brown during his remaining years, which we hope and trust will be many, and that they will be filled with that honor and respect which is but the fruitage of a life well spent.

Resolved: That Col. and Mrs. Brown are cordially invited to meet with the Board as our guests at our next Mid-Winter Meeting.

Resolved: That a copy of these resolutions be spread upon our Record book and also sent to Col. Brown.

The above resolutions were unanimously adopted by the Board, July 1, 1909.

IVERSON C. FANTON,
Secretary.

State of Connecticut.

BOARD OF AGRICULTURE.

WHEREAS: Mr. Seaman Mead of Greenwich and Mr. Edmund Halladay of Suffield have been Members of this Board for the past twelve years, and Mr. Charles L. Tuttle of Hartford for the past ten years, and

WHEREAS: They each retire from the Board this day by their own volition; having faithfully served the Board and through the Board, the State of Connecticut during all these years, without receiving one penny of compensation, either directly or indirectly. Therefore be it

Resolved: That we, the State Board of Agriculture, now in session in Annual Meeting, on this the first day of July, 1909, do hereby express our hearty appreciation of the valuable service they have rendered. Having been leaders in thought and the advancement of agricultural interests, always willing and anxious to do their part in any and all duties assigned them. Be it further

Resolved: That we regret that we are, from this time on, deprived of their valuable counsel and good judgment, but rejoice that we have very many pleasant memories of their association with us. Be it further

Resolved: That a cordial invitation be extended to the above-named gentlemen to meet with us as guests of the Board at our next Mid-Winter Meeting.

Resolved: That a copy of these resolutions be spread upon our Record book and also one sent to each of the above-named gentlemen.

The above resolutions were unanimously adopted by the Board, July 1, 1909.

IVERSON C. FANTON,

Secretary.

INSTITUTES.

During the past years, institutes, in Connecticut have been held by the different State Associations, and by the Board of Agriculture, each acting in a measure independent of the other; each paying the expenses of the institute conducted under its supervision, from the funds appropriated by the State. The manner of conducting institutes in Connecticut has been a matter of considerable thought and study by those having the best interests of the State at heart, and naturally there are many differences of opinion. A large majority, we believe, think the work should be systematized, so as to avoid any conflicting in dates or speakers and also to avoid the expense of speakers traveling from one side of the State to the other.

In order to bring about the desired results, an Advisory Board of Institute Work was formed, consisting of the secretaries of the different State Associations. In November, 1909, this Advisory Board was reorganized, with I. C. Fanton, Secretary of the State Board of Agriculture, as Chairman, Harrison L. Hamilton, Secretary of the Connecticut Poultry Association, as Secretary, and Burton C. Patterson, Secretary of the State Sheep Breeders' Association, as Treasurer.

The plan, as formulated by the Advisory Board, was to get all the applications for institutes in, on or before a certain date; then to confer together and lay out a systematic plan of work, assigning to each association the work it could take care of to the best advantage, considering its available finances and the topics asked for.

Accordingly the following circular letter was sent to the master and lecturer of every subordinate Grange in the State:

Worthy Patrons:

The dissemination of knowledge of better methods of farm practices and management through the medium of farmers' institutes is admitted by all to be a most excellent form of

educational work. The Grange is the principal medium through which we have reached the people in the past and for that reason we are seeking your co-operation at the present time.

We have a limited amount of funds at our disposal which we propose to use in securing the best speakers obtainable upon the following subjects: Fruit Growing, Dairying, Poultry Raising, Forestry, Bee Keeping, Sheep Breeding and Home Improvement. We would recommend the all-day institute with a social hour at noon, which in many cases is as profitable as any part of the program, but where this is not practicable, we will gladly hold an evening institute, furnish one or more speakers upon any subject desired. The meeting to be open to the public, the Grange to entertain the speaker and transport him from and to the railroad station.

Will you kindly co-operate with us to the extent of bringing this matter before your Grange at your next meeting, decide upon the kind of institute you prefer and notify at your earliest convenience either of the above named members of the Advisory Board. Provisional lists of topics and speakers are on file with each member of the Advisory Board, copies of which may be obtained upon request.

Faternally yours,

I. C. FANTON,

Chairman.

In response to the foregoing circular letter, thirty-four applications have been received, and provisions are being made to supply each of these applications with speakers upon the topics specified, and in as systematic a manner as possible, under existing conditions.

The plan as heretofore outlined is not perfect as yet, but we believe something has been accomplished, and that we shall eventually see the work thoroughly systematized.

AGRICULTURAL CONVENTION AT NEW HAVEN.

The Annual Midwinter Meeting of the Board of Agriculture was held in Harmonie Hall, New Haven, December 7, 8 and 9, 1909.

PROGRAMME

Tuesday, December 7th.

10.45 A. M. MUSIC.

11.00 A. M. INVOCATION. *By Rev. Watson L. Phillips, D.D.*

ADDRESS OF WELCOME.

By His Honor James B. Martin,

Mayor of New Haven.

RESPONSE.

By His Excellency Frank B. Weeks,

Governor of Connecticut.

11.30 A. M. ADDRESS. *By Prof. Arthur T. Hadley,*
President of Yale University.

11.45 A. M. ADDRESS. *By Prof. C. L. Beach,*
President of Conn. Agricultural College.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS—"Incubation."

By Mr. Charles F. Stephenson,

Storrs, Conn.

2.45 P. M. ADDRESS—"A Woman's Success in Poultry Culture."

By Mrs. Mollie McC. Allen,

Oswego, N. Y.

3.30 P. M. CHALK TALK.

By Mr. W. H. Card,

Manchester, Conn.

RECESS.

7.15 P. M. MUSIC.

G.C.J P. M. ADDRESS—"Further Investigation of White Diarrhea in Chicks."

By Dr. L. P. Rettger,

Sheffield Scientific School, New Haven.

And by Prof. F. H. Stoneburn,

Conn. Agricultural College.

8.30 P. M. ADDRESS—"Game Birds under Domestication."

By Dr. C. F. Hodge,

Clark University, Worcester, Mass.

(Illustrated with large collection of lantern slides.)

Wednesday, December 8th.

9.45 A. M. MUSIC.

10.00 A. M. ADDRESS—"Re-establishment of Sheep Husbandry in Connecticut."

By Prof. R. L. Gribben,

Professor of Animal Husbandry, Mass. Agricultural College.

10.45 A. M. ADDRESS—"The Importance of Sheep Husbandry in New England."

By Hon. Frank Gerrett,

Greenfield, Mass.

11.45 A. M. "A Review of the Present Dog Laws of Connecticut."

By Mr. F. H. Stadtmeuller,

Elmwood, Conn.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS—"Corn in New England."

By Prof. J. A. Ford,

Amherst, Mass.

3.00 P. M. ADDRESS—"Corn Growing, Seed Selection, Planting and Cultivating."

By Col. J. B. Walker,

Hopkinsville, Ky.

RECESS.

7.15 P. M. MUSIC.

7.30 P. M. ADDRESS—"Alfalfa and Clover Growing."

By Col. J. B. Walker,

8.15 P. M. ADDRESS—"Alfalfa Growing in Connecticut."

By Col. Charles M. Jarvis,

Berlin, Conn.

9.00 P. M. ADDRESS—"Dairying in Europe vs. Connecticut."

By Vice-President Wilson H. Lee,

Orange, Conn.

Thursday, December 9th.

9.45 A. M. MUSIC.

10.00 A. M. ADDRESS—"Animal Husbandry."

By Prof. H. H. Wing,

Cornell University, Ithaca, N. Y.

11.00 A. M. ADDRESS—"The Nitrogen Problem in the Dairy."

By Prof. William D. Hurd,

Amherst, Mass.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS—"Best Methods of Improving the Dairy Cow."

By Prof. J. M. Truman,

Conn. Agricultural College, Storrs, Conn.

3.00 P. M. ADDRESS—"Every Farmer His Own Corn Breeder."

By Dr. E. H. Jenkins,

Agricultural Experiment Station, New Haven.

Premiums.

The Board offers the following premiums for the best exhibit of Corn by individual growers in the State:

CLASS A.—DENT CORN.

	1st	2d	3d
Division 1—10 ears early yellow,	\$5	\$3	\$2
“ 2—10 ears late yellow,	5	3	2
“ 3—10 ears early other than yellow,	5	3	2
“ 4—10 ears late other than yellow,	5	3	2

CLASS B.—FLINT CORN.

	1st	2d	3d
Division 1—10 ears early yellow,	\$5	\$3	\$2
“ 2—10 ears late yellow,	5	3	2
“ 3—10 ears early other than yellow,	5	3	2
“ 4—10 ears late other than yellow,	5	3	2

CLASS C.—10 ears early Sweet Corn.....1st, \$5; 2d, \$3; 3d, \$2.

CLASS D.—10 ears late Sweet Corn.....1st, \$5; 2d, \$3; 3d, \$2.

CLASS E.—10 ears Pop Corn.....1st, \$5; 2d, \$3; 3d, \$2.

CLASS F.

Best ear of Dent Corn, \$2.50

CLASS G.

Best ear of Flint Corn, \$2.50

The Connecticut Sheep Breeders' Association offers the following prizes upon wool to be exhibited at this meeting December 8, 1909

Class I. Fine Wool,	Best fleece, \$5.00; 2d Best fleece, \$3.00
Class II. Medium Wool,	Best fleece, 5.00; 2d Best fleece, 3.00
Class III. Coarse Wool,	Best fleece, 5.00; 2d Best fleece, 3.00
Class IV. Combing Wool,	Best fleece, 5.00; 2d Best fleece, 3.00

Special prizes will be awarded for the two fleeces put up in the neatest and most attractive form for market.

First prize,	\$5.00
Second prize,	3.00

Competitors must be members of the Connecticut Sheep Breeders' Association, and must be owners of the sheep from which the fleece shall have been taken; all fleeces to be selected only from sheep kept in the State. The inspection of exhibits and awards are to be made by wool experts.

The meetings will be open to all interested in agriculture, and it is hoped that all will come prepared to participate in the discussion of important subjects that will be considered.

A Committee of the Board will render such assistance as may be required to all in attendance.

A special invitation is extended to the ladies to be present.

RULES GOVERNING APPLICATION OF SPECIAL REDUCED FARES BETWEEN LOCAL STATIONS ON CERTIFICATE PLAN.

The fare for the round trip in connection with certificates will be on the basis of full fare going and three-fifths fare returning, but this will not apply from stations where the round trip fare will figure less than twenty-five cents, nor for children traveling on half tickets, and there must be one hundred or more orders deposited with the ticket agent at the place of meeting, as it is absolutely necessary under this arrangement that the minimum number of one hundred be deposited in order to get the reduction on the return trip.

Tickets should be purchased for the going trip and application made to the ticket agent at the initial point for certificate which agent will issue in connection therewith (application must be made sufficiently in advance of train time to enable agent to issue same), and this certificate must be deposited immediately upon arrival with the station ticket agent at the place where the meeting is held.

The ticket agent at the point of the meeting will, when the order is deposited with him, detach the passenger's identification stub and return to the passenger, which it will be necessary to have countersigned by your Secretary.

The ticket agent at the point where the meeting is held will issue tickets for the return journey to the original purchaser (as tickets at these fares are non-transferable) at three-fifths the regular one-way fare (sufficient being added to make return fare end in 0 or 5), provided there are one hundred orders deposited with him and that the identification stub presented by passenger has been properly countersigned.

The headquarters of the Board will be at the Tontine Hotel.

WILSON H. LEE,
D. WALTER PATTEN,
I. C. FANTON,

HARTFORD, November 16, 1909.

Committee.

PROCEEDINGS.

PROCEEDINGS
OF THE
ANNUAL MID-WINTER MEETING
OF THE
Connecticut Board of Agriculture

At Harmonie Hall, New Haven, Conn.,

DECEMBER 7-8-9, 1909.

FIRST DAY — MORNING SESSION.

Music.

Meeting called to order at 11 o'clock, with His Excellency, Governor Frank B. Weeks, President of the Board, in the chair.

The PRESIDENT. Ladies and Gentlemen: It is now 11 o'clock. There will be some of the speakers who are in a hurry to get away, and I am going to ask you to come to order, and without further opening remarks on my part, I am going to ask the Rev. Dr. Phillips of New Haven to give us an invocation.

Dr. WATSON L. PHILLIPS. Let us all pray. O God, our Father, we come to Thee to offer our adoration and our praise. Thou hast given us all life and the ways of all good. Thou sendest the early and the latter rain that there may be fruition of the seed in the soil and bread for the eater. It is Thy blessing upon field and vineyard and flock that causeth their increase. Thou art back of all things that cheer us, and comfort us, and strengthen us, and we offer Thee devoutest praise for Thy goodness, which has been without fail from everlasting to everlasting. We thank Thee for our broad acres, our forests, and our mines. We thank Thee for the prosperity which has attended us and the rich results that have followed the labors which have been acknowledged of Thee; but most of all we thank Thee for those qualities in our people which have given these material possessions their larger

value, for the honesty and integrity, for the disposition to fear God and love each other which has characterized our citizens, and which has made itself manifest in all their doings and all their relations. We thank Thee for the principles our fathers have established here and committed to their sons as their most sacred legacy, and we beseech Thee in these days of our great prosperity, when the blessing of God has made us rich, that we may not forget these principles and precepts of our fathers, but may continue to be a God-fearing, honest, upright people, who shall acknowledge Thee in all their ways. And now, our Father, we ask that blessing upon us and all our kindred. We pray that Thou wilt bless those in authority over us, the President of these United States, and all bearing with him the responsibilities of the general government; the Governor of this State, and all the interests of this old commonwealth; the mayor of our city, and all the men who are interested with him in working out our municipal problems; and we pray that everywhere among the states and the communities of this nation there may appear those results of our trust in Thee and our efforts to serve Thee which shall gladden our hearts. Let thy blessing also be upon this organization which calls us together, and upon all organizations of men that are working for the uplifting of the people and the bettering of our conditions. Grant unto us, we beseech Thee, that we may be that happy people whose God is the Lord, and that we may reap the rich rewards which are promised to them that walk in Thy fear and in the love of their fellow-men; and not unto us, O God of our fathers, and our God, but unto Thy name shall be the glory forever. Amen.

The PRESIDENT. Now, ladies and gentlemen, since coming to this hall and looking over the program, I have been somewhat surprised to see the list of speakers and the length of the program. I had no idea, although I am President of the Society, that such a program was to be given to the people interested in these subjects today. An official, if he does his duty, is a busy man, and when I see the name of Mayor Martin, knowing what he has on his hands, and of Dr. Hadley of Yale, knowing what he has upon his hands, I think the Connecticut Agricultural Society is to be congratulated that those gentlemen will give us this hour, the busiest hour of the day, to come here to speak to

us, and I know that I echo the voice of everyone present when I say that it will give us great pleasure, and I take great pleasure in presenting the mayor of the city of New Haven, Mayor Martin.

MAYOR JAMES B. MARTIN of New Haven. Mr. Chairman, Ladies and Gentlemen: Notwithstanding the kind and flattering words of the Governor, I must differ from him in opinion when I say that mine is the pleasure this morning of being present at this annual mid-winter meeting of your Board; and I regard it as an honor and a compliment to take even a small part in the opening exercises of such a convention as this; for I can assure you in all sincerity that I appreciate as a high privilege the opportunity I enjoy this morning of once more meeting His Excellency the Governor, and of meeting members of the State Board of Agriculture, and meeting so many influential, worthy and representative citizens of Connecticut without distinction of sex as I see before me now. I know, Mr. Chairman, that you, collectively and individually, have all done much, achieved much, accomplished much for the good and the welfare and the prosperity of this our commonwealth, and I also realize that you are gathered together this morning here in this beautiful City of Elms, not for any selfish ends or purely social enjoyments, but for the same laudable purpose and the same worthy mission of doing what in your power lies to advance and promote the primal and still important industry of agriculture. And so I can say truthfully that I find it a great pleasure to offer you on behalf of the people of New Haven a most hearty, sincere and hospitable greeting.

Although New Haven is hardly to be classed as an agricultural community, and I, as a native son, can scarcely claim very much consideration or authority for my views or opinions upon farming matters, or upon farm products, except in so far as the latter have been prepared for the market or for the table, nevertheless I am not lacking in appreciation of the importance of the interests which you represent and are serving, nor of the value of the work that is being carried on under the direction of the State Board of Agriculture, nor of the great and practical good that comes out of such meetings as this with which you are now favoring our city.

From your program I see that there are a number and a

variety of important subjects to be considered and discussed, and I know that during your sessions you will hear many interesting, eloquent and profitable addresses by able speakers and well informed authorities, and so I would not presume at this, the outset of your convention, with any platitudes of my own upon the science of agriculture, its status or its requirements, or attempt to throw out to you any second-hand suggestions as to its development and encouragement. Rather, I will content myself with sticking to the duty assigned me, of addressing a few brief but sincere words of welcome, and I again express to you the gratification of the people of New Haven at your coming. We feel proud and glad at having our city made the abiding place of such a convention as this. Our public buildings, our institutions, our parks and all our attractions are at your disposal, and invite your inspection during the leisure of your stay. I am glad personally that you are to be among us for a few days, and I trust that your stay will be as pleasant as I know it will be profitable to you.

Once more, Mr. Chairman and members of the Board, friends, I bid you a hearty welcome to our city. (Applause.)

Governor WEEKS. Mayor Martin, on behalf of the Connecticut Board of Agriculture, assembled here in convention, and on behalf of the ladies and gentlemen here present, I thank you for the hearty welcome you offer us as mayor of the city of New Haven. It is indeed appreciated, sir, and we accept it in the same hearty spirit in which it is given. There is no doubt in my mind but what the sessions will not only be profitable to the State, but that our stay in the Elm City will be most enjoyable.

Ladies and gentlemen, when I received my notice of this meeting it seemed to me almost impossible that I could be here. Up even to yesterday noon that was the situation, but I did wish to come and show my interest in the matter which brings your body here today — in agriculture. I am very sorry, and I dislike very much to make an apology, but it seems to me due to you for me to say that an engagement that calls me out of the State will make it impossible for me to stay longer than a little past noon, but since looking over the program I want you to believe it when I say that I know that you are going to have a mighty pleasant entertainment.

Now I do not want you to think that I am going to talk long

because I have a few notes in my hand. I could speak, and perhaps say what would satisfy me but not you, but there are a few thoughts in my mind that I want to speak upon, and as I wanted to present them intelligently I have put them down. I am going to give them to you from this little memorandum I have made. I was very much amused in coming down on the train this morning to pick up a New Haven paper — perhaps some of you have seen it. It starts off like this: "If you are not a farmer and want to be one, or if you are a farmer and want to be a better one, go to Harmonie Hall tomorrow, Wednesday and Thursday."

Now from the program I think those who want to be farmers can learn enough to start off intelligently, and those who want to be better farmers will go away with the idea that they have learned something by attending this convention today. Now I am not a farmer, nor am I the son of a farmer, and have only a superficial knowledge of the art of agriculture, but I can assure you that I am interested, and wish to know more of the mysteries of this most wholesome of professions. I have remarked several times this year that I believe that it is highly beneficial for any industry to come together and discuss matters that are of vital importance to that industry, and of agriculture more than any other, for it is an individual occupation. Agricultural matters are now receiving more attention than at any time, if I am informed correctly, within the past forty years, and it is well that it should be so, for while the population of the United States has increased from the usual conditions at home and from immigration, the cultivated area has decreased and thousands of acres formerly raising products have gone to pasture and have gone to waste. I do not think that I put that any too strong. I have ridden over this State considerably in the last year or two, and I think that I will stand by that statement. It looks as if our country would have to stop exporting corn and meat, and every state, I say every state, will soon have to raise to a much greater extent its own fodder and its own meat.

The conservation movement is receiving a great deal of attention throughout the country, and I may say in passing that I shall leave here at noon to attend the Conservation Convention or, more particularly, the Waterways Convention, to be held in

Washington tomorrow and succeeding days. There will undoubtedly be some five hundred delegates present. The President will start the discussion. They will have three days for discussing this matter of national waterways and they may, before they get through, touch upon the matter of the conservation of the soil and of the preservation of our watersheds. The conservation movement has received a great deal of attention — conservation of our watersheds, our waterways, our forests and our soil, and this subject will receive more attention probably during the next few years than 'most any other that could be brought to the attention of the American people. Our agricultural societies should inform themselves fully upon these great subjects, for the waterway and the forest question has very much to do with the soil. In our country's history we have passed the milestone of selfishness. We are going forward to build and conserve our resources which were given to our fathers that they may be preserved undiminished and improved for those who shall follow us. We look to our agricultural societies to use every means within their power to accomplish this. Conservation does not mean to stop using, but wise use, looking toward the need of each generation. Minerals and phosphates are destroyed by use, and timber and soil, by proper care and treatment, can be continued. Our farmers must realize how much the happiness and prosperity of future generations depend upon them in preserving and enlarging the possibilities of the soil. Last night I was looking over my papers, the daily papers, and I saw some surprising farm figures. I instantly clipped them out, and I am going to give them to you. Those of you who have heard them can well afford to hear them again, and those who have not heard them will be surprised to hear them, I think. One hundred and sixty million acres, or one-eighth of the farm land of the United States, have been mapped out and the soil analyzed. This work has disclosed 700 different types of soil, and will eventually include many hundreds more. There are 6,000,000 farms in the United States and 30,000,000 of farm people. The Department of Agriculture is spending \$8,000,000 annually in experiment in vegetable and animal foods in attempting to improve the quality and keep down the cost of production, all to aid the farmer. Those are surprising figures. I am glad to give them to you.

During the last summer it was my pleasure to speak somewhat to farmers at the agricultural fairs, and I am going to say something now — perhaps you say I have said it before, but it interested me greatly, and that is the reason I am going to say it again. I have been in the western country and have been interested in the growing of alfalfa. Mr. F. D. Coburn, Secretary of the Kansas State Board of Agriculture, has given out some figures showing that in eighteen years alfalfa has been the leading grass crop of his state. It ranks third in aggregate area, corn and wheat only exceeding it. He is of the opinion that it will grow in many parts of the United States. Let me ask this Society, can it be made to grow in Connecticut? Has it had a fair trial? If not, would it not be well to look into the matter, for the crop is certainly the most prolific and profitable of any of the grass crops, and if I do not mistake, I recall the figures where an acre of hay yields about \$32; if alfalfa can be grown, it will yield in the neighborhood of sixty to seventy dollars.

Now just one thought more and I am through. It is to have the children who are brought up on the farms trained to love rural life and follow in the footsteps of their fathers — keep the old homes in the family. (Applause.) I thank you for that because it means a great deal to this State. There has been a large increase of city population at the expense of the country communities. A large proportion of the farm boys who think that city life has the best advantage make a very great mistake. As I have said before, and I repeat it here today, the land is the foundation of the state in every sense of the word, and a sturdy independence of character is the land's best product. I thank you. (Applause.)

Vice-President WILSON H. LEE. Mr. Chairman, Dr. Hadley has not arrived, I think, and I would suggest that you call upon Dr. Phillips.

Governor WEEKS. Without further introduction than that which he has already received, Dr. Phillips will please take the floor.

Dr. PHILLIPS. Your Excellency and members of the Agricultural Society, for such I suppose it is: I shall not take any time to make apologies, but I had no idea of being called upon to address you this morning. I supposed that my duty in con-

nection with your opening exercises would be done when I had asked God's blessing upon you, but I am very glad to look into your faces. I have the same confession to make as the Governor, that I am not a farmer, nor am I the son of a farmer. I come of a line of preachers, though I believe that some of my father's ancestors, and I am quite sure my mother's ancestors, were farmers. Tracing my mother's family back I find that the first of our name was a farmer in Massachusetts, in the old town of Deerfield, and was one of the people concerned in the Deerfield massacre. So I have some connection with farmers and with the soil.

I realize the significance of the words the Governor has spoken. I do believe that a young man who leaves the farm because he thinks life's conditions are easier in the city makes the mistake of his life. It has been my privilege to travel about New England somewhat, and my heart has been made sore as I have come upon these old decaying farmhouses in so many of the outlying districts. The doors gone, the windows out, the partitions falling, the ceilings sagging, and with every evidence that they who once lived there have either died or departed for some other section of the country and some other employment. I do not know of anything more saddening than to come upon one of those wrecks of past happiness, beautiful and comfortable family life, that stare us in the face on so many of our country roads, and I am one of those Americans who hope that the time will speedily come when the sons of the farmers will see in the continuation of the life of their ancestors the best hope for themselves and the largest opportunity for ministering to the need of the time in which they live.

I should be glad to have one of my sons say to me, "I want to settle in the country and live close to nature, and get what I can out of life through the methods of those who have devoted themselves to the cultivation of the soil and supplying the needs of the people who are less fortunate."

Dr. Hadley has come in, and I know you are waiting to hear him. I will take no more of your time, but thank you for the opportunity of looking into your faces.

Governor WEEKS. The remarks just made by Dr. Phillips touch me upon a subject in which I am very much interested.

And you good people who are agriculturalists, when you get together during these winter evenings in your meetings, or wherever it may be, won't you give that a thought, the keeping of the old home intact — won't you give that a thought, and let the children understand it a little bit?

We have with us this morning another very busy man. I am not going to take much time in introducing him, because that would be superfluous. I think all of you know him. I, for one, am, and I think all ought to be, proud and happy to have such a man who can come in and speak to a gathering like this. I have very great pleasure indeed and honor in presenting Dr. Hadley of Yale.

Dr. ARTHUR T. HADLEY. Ladies and Gentlemen: It is a great pleasure to welcome in New Haven an educational institution of the importance of the State Board of Agriculture. When I say educational institution I say it advisedly. We have broadened our ideas of education in the last thirty years. We have got away from the time when we tried to divide life into sections, and thought that the schooling belonged in one section and practice in another. We now see that the best schools are those which teach the children to do things, and we think that the best practice is the practice which represents an education to the man who is doing the work, an education which does not stop until he has reached either the insane asylum or the grave. A great many people have told of the fruitful ideas of the nineteenth century. I doubt whether among them all there is one more fruitful than this idea, that grown men need to keep on educating themselves, and the organizations in which we meet thus to develop our knowledge of practical work are the most valuable parts of our education. All of these things have a most important bearing in any event, but they have special importance in connection with the political tendencies of the present time. We hear all the time in agriculture, in railroading, in all the different professions, of the difficulty of getting men to take the lead. Formerly, we trained our leaders in shops or offices, or on the farms, where they had to do all-around work in competition with others, and the man who could fight the hardest and come out best in that all-around competition was best. He was the leader. Today we are face to face with an age of specialization. It has not been

so marked on the farm as it has been in the shop or in the office, but for the farmer, generally speaking, it is an age of specialization. We do not get to the degree that we did fifty years ago the all-around training, we do not get the general right to decide which is the best man that the voters must follow. How shall we decide it? We can only decide it by the intimate exchange of ideas. We can decide it by societies and associations like this, where each man shows to the others the results of his thinking, and in keen discussion it appears which man thinks straightest, has the most practical suggestions, and, in short, is the safest guide to follow.

Now, of course, this is not the same thing as competition. It selects leaders on a somewhat different basis, but I believe that in the economy of today it is an invaluable means of showing who is the leader. If, as some think, public activity is coming more and more to take the place of private activity in the organization and in the direction of industry, most important is it that there should be organized forums of discussion that will show who ought to be the guide, that will show the voters, when it is a question on which they have to vote, whom they ought to vote for; that will advise the Governor, if it is a question on which the Governor has authority, how he ought to exercise it wisely. I believe, therefore, that a body like this, representative and important, represents not only a culmination of the educational system of a community, as we understand it now, but an important unit in the political system as our children are coming to understand that. On all grounds, then, Yale deems it a privilege to welcome this body here. As an educational institution, we welcome you, for you give a most valuable kind of education, the education which grown-up men, schooled in practice, give each other. As an institution interested for more than two hundred years in public service, from the date of our earliest charter, beginning to train men for public service in church and state, we welcome you as representing the last and perhaps the most important idea of organized training for public service on which rests the future of the State of Connecticut and of the American continent. (Applause.)

Governor WEEKS. The next speaker upon the program is Professor C. L. Beach, President of the Connecticut Agricultural College. Mr. President, will you please come up here to speak?

President C. L. BEACH. Mr. Chairman, Ladies and Gentlemen, and the Board of Agriculture: The Secretary has given me such a latitude as to subject and time that in order that I may not be tempted to trespass upon your dinner hour I am going to read what I have to say to you this morning.

AGRICULTURAL EDUCATION.

ADDRESS OF PRES. C. L. BEACH.

It is a modern theory that every young man and woman should have the opportunity for an education, and that this training should be in part vocational. If the educational policy is to recognize the varying needs of individuals, then each student should have the opportunity of an education by means of, and in terms of, the things in which he lives. There can be no standard type of education, therefore, and each educational institution must arrange its curriculum to serve its constituency.

Education by means of agriculture is not a new conception. "It has long been recognized that the farmer should be schooled for his occupation, but no adequate system has yet been worked out." The desire for agricultural education developed early in Connecticut, and it will be instructive, therefore, and a matter of local interest as well, to recall the several attempts to establish agricultural schools in this State.

An agricultural seminary was opened at Derby in 1824. In addition to French, Latin, Greek, history and other subjects, the prospectus stated that practical surveying, the application of natural philosophy to the various kinds of machinery and agricultural instruments, testing the principles of chemical science in the mixing of soils, manures, making cider, beer, spirits and various other articles of agricultural economy will be taught. The school was discontinued after two years.

An agricultural department was organized at Trinity College at the time of its foundation in 1824. An announcement states that "as agriculture is the primary source of life and subsistence, and as a knowledge of it is highly useful to men of almost every profession, it is designed to make it an important branch of education. It will be the province of the professor

of agriculture to explain the nature of different soils, and their adaptation to the growth of different vegetables, the structure of plants and the function of the several vessels by which they receive and elaborate their food, and their change into vegetable matter, the nature and operation of different manures, the proper succession of crops and all the means which conduce to the melioration of the soil. These and other theoretical instructions will be illustrated by all the practical operations of husbandry. An interest will be given to the pursuits of science, and our youths will acquire a taste for the active business of life and will go forth fitted to become useful members of society." But the students were more interested in the religious instruction offered, and no one appears to have wanted agriculture in that way at that time.

The Cream Hill School at Cornwall was started by Theodore S. Gold and his father, and for twenty-five years offered instruction in both scientific and practical agriculture and horticulture, embracing the most improved methods of tillage, rearing of stock, cultivation of trees, laying out of grounds, ornamental gardening, chemical analysis of soils, etc. A portion of each day was allotted to these objects, that the pupils might become scientific and practical farmers.

Agricultural instruction, particularly along chemical lines, developed early at Yale University. Mr. Norton was appointed professor of agriculture in 1846, and in 1850 published a text book called "The Elements of Scientific Agriculture." Yale Scientific School became the recipient of the land grant funds in 1864. William H. Brewer was appointed professor of agriculture and a definite course in agriculture was planned during that year. Two remarkable agricultural books "How Crops Grow" and "How Crops Feed," prepared by Professor F. W. Johnson of Yale College, were published in 1868 and 1870.

Storrs Agricultural School was established in 1881, a gift to the State by Augustus and Charles Storrs of a farm of 170 acres with commodious school and farm buildings by the former and \$6,000 in cash by the latter, of which \$5,000 was for fitting the institution for work and \$1,000 for drainage. The State accepted these gifts and appropriated \$5,000 annually for three years for maintenance. The first prospectus states "That the school being unlike that of any other institution existing in this country, the order of studies, the time devoted to the subjects taught, and to some extent the subjects themselves, must be determined by experience, and will largely depend upon the

capacity of the scholars. Much of the instruction is not contained in text books, and cannot be given or acquired by the usual methods."

These early attempts to educate farmers' sons by means of agricultural subject matter at Storrs, at Trinity, at Yale, at Cream Hill and at Derby, were only partially successful, if not complete failures, largely because there was no subject matter to teach. There were no agricultural text books, no agricultural teachers. The science of agriculture had not then been worked out. The essentials for the admission of a subject to educational recognition, namely, a sum of useful knowledge sufficiently systematized to afford mental discipline to the recipient, were altogether lacking.

The desire for education in terms of agriculture was widespread, and finally culminated in an endowment by the national government of 30,000 acres of land to each state for each Senator and Representative in Congress. The proceeds from the sale of such lands were for the support and maintenance of a college where the leading object shall be to teach such branches as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education in the industrial classes and in the several pursuits and professions of life.

Colleges organized under this act had a precarious development at the outset. The purpose and scope of their work was vague and indefinite. A college without a curriculum, without text books and without teachers is not apt to be a marked success.

It was not until about twenty-five years later, or in 1887, that Congress came to the aid of land-grant colleges and provided the means for investigation and research, out of which has developed the science of agriculture. The Hatch act, appropriating \$15,000 annually to each state and territory for the establishment of an agricultural experiment station, has been designated as the most important single legislative enactment for the cause of education in this or any other country. The appropriations from the general government for land-grant colleges two years hence will amount to \$50,000 for education and \$30,000 for investigation to each state.

This brief review will lead to an understanding of the purpose and function of the college of agriculture and mechanic arts. These organizations were in part "a protest to the older educational methods and traditions." They were created by the people and for the people in recognition of the idea that education was made for man, and not man for education.

The agricultural college of today is a highly complex institution, expensive to equip and to maintain. The old single course in agriculture, presided over by a single professor, has given way, and in some of the advanced colleges more than one hundred distinct courses in agriculture are offered at the present time, requiring a large corp of instructors. The range of activities includes:

1. Investigation and research.
2. Post-graduate work.
3. Instruction of college grade to students of college rank.
4. Secondary instruction in agriculture to special students, who from lack of ability or means cannot enter or pursue a four-years' course of college grade.
5. Practical instruction in poultry, dairy husbandry, horticulture and domestic science, for farmers' sons and daughters by means of winter courses.
6. Summer school of nature study and agriculture for teachers.
7. Lectures at farmers' institutes, boards of agriculture, farmers' clubs and Granges.
8. Correspondence.
9. Personal visitation and individual help.

There is no logical reason why all of these activities may not be conducted in one institution under a single management, providing the work is properly systematized and sufficiently officered and generously supported.

COLLEGE INSTRUCTION.

The common idea of a college is four years of instruction superimposed upon a high school preparation, and leading to a degree at graduation. The agricultural college should maintain one department of this character, with the same entrance requirements and equivalent curriculum and academic rank as higher institutions of learning, and to confer equivalent degrees. This department will train teachers, investigators and farmers, who are to become leaders in country life. An institution must not lift itself above its constituency, however, and until high schools become more common, affording farmers' sons and daughters the opportunity for preparation, entrance requirements to the college of agriculture should not be placed above their reach. To require a high school preparation for admission to Storrs at

the present time would in a measure defeat the aim for which the institution was established. In order to connect with the common school, a two-years' academic course is offered with instruction similar and equivalent to the first two years of high school. Those who have completed this course, or its equivalent, are admitted to the agricultural, mechanic arts or home economics courses, and graduated after three years of study, and receive a diploma. An additional year is required for the B. S. degree.

The nature and character of the instruction of the courses at the Connecticut Agricultural College is shown in the following schedule of studies, all required:

HOURS OF INSTRUCTION.

Subjects	Academic Course 2 yrs.		Agr'l Course 3 yrs.		Mech. Arts 3 yrs.		Home Economics 3 yrs.	
	HOURS		HOURS		HOURS		HOURS	
	Class	Lap.	Class	Lap.	Class	Lap.	Class	Lap.
English and Elocution,	468		360		360		360	
History and Civics,	360							
German,					360		360	
Economics,			48		48		48	
Mathematics,	360		36		363	33		
Sciences,	108	50	424	399	263	310	539	552
Agriculture,		57	505	444			72	121
Mechanical,			138		152	962		
Domestic Science,							207	814
Dairy Husbandry,			196	225				
Drawing,		72						
Military Drill or								
Exercise,		216	24	324	24	324		324
	1296	395	1593	1530	1570	1629	1586	1811
Or Horticulture in place of Dairy Husbandry,			188	318				

INVESTIGATION.

Up to the present time experiment stations have concerned themselves largely with demonstrations having to do with the maintenance and fertility of land by means of proper care of barnyard manure, plowing under green cover crops, artificial fertilizers, tests of crops and their adaptability to various soils. Fattening trials with hogs, cattle, sheep and poultry. Breed tests. The life history of noxious insects and remedies for their destruction, the best treatment of fungus diseases. The analysis of feeding stuffs, ensilage of fodders, the promulgation of the

balanced ration. The work of the station in the main has been demonstration work. This was unavoidable because of the pressure for practical information along all lines. The tendency has been for diffusion rather than acquisition of knowledge, education and demonstration rather than the discovery of new truths. It is recognized, however, that the time has come when agricultural investigators must address themselves to more fundamental problems. Many problems remain unsolved. The realm of soil bacteriology remains unexplored. Farmers suffer immense losses of live stock annually because no remedies have been discovered. Insects and fungus diseases of plants cause the loss of millions of dollars. Large areas of soil lie idle and unproductive because we do not know what to do with them. Soil fertility is lost, and means of prevention are unknown. No problems demand for their solution more searching and profound methods than do those pertaining to agriculture. For this reason agricultural investigators should be trained as "broadly and as severely as any other class of scientific men." Future progress in agricultural efficiency depends upon it. The well-springs of knowledge must not be allowed to go dry, and unless new discoveries are forthcoming, inspiration will be lost and retrogression will inevitably follow. Fortunately the recent Adams act, appropriating \$15,000 to the experiment station of each state, stipulates that the money shall be used only for investigation as distinguished from experimental demonstration.

EXTENSION WORK.

Extension work comprises those activities which are carried on by the college for the most part away from the institution. It is an effort to be of service to the people individually, and in their own homes. An enumeration of some of the lines of extension will suggest the variety and scope of this work.

1. Correspondence with individual farmers.
2. Lectures at farmers' institutes and Granges.
3. Preparing and sending out farmers' bulletins.
4. Agricultural reading courses and circulating libraries.
5. Preparation of articles for the public press.
6. Coöperative experiments.
7. Agricultural exhibits at fairs.
8. Organized excursions to the college and elsewhere.

This department of the Agricultural College is receiving considerable attention at the present time, and it is recognized that

a separate corps of trained men should be delegated to this work, and receive special appropriations.

WINTER COURSES.

Supplementary to its longer course the college offers short winter courses in dairying, poultry husbandry and horticulture. These are designed for those who lack the preparation, time or means to pursue a longer course, and who desire to gain a knowledge of the general principles underlying the dairy and poultry industries and horticulture. One hundred sixty-one students have been enrolled up to date in these courses.

SUMMER SCHOOL OF NATURE STUDY AND AGRICULTURE.

A course in nature study and agriculture, designed primarily for rural school teachers, is given during the summer. Familiarity with nature is no longer to be classed as a luxury in the educational dietary. It is a child's rightful heritage, and he either gets it or it is withheld from him. The successful teachers are those with a keen interest in the life about them, and in sympathy with the normal activities of their pupils. One cannot sympathize with things or people that one knows nothing about. The summer school is planned to meet the needs of teachers, especially those in rural schools, as well as of other persons who wish to gain a first-hand knowledge of nature and country life.

ENROLLMENT.

The total enrollment in long and short courses is 1,554, of which 310 are graduates, 161 students of the winter dairy, poultry and horticultural courses, 382 students of the summer school of agriculture and nature study and 615 part-time students have pursued studies for a period of less than four years in the regular classes. Eighty-six students have not yet completed their courses.

Much of the work that is being done at the present time is secondary in character, but when agricultural instruction is introduced into the high schools, or consolidated country schools of the State, much of the work now being done at Storrs can be passed over to other hands. The students of the winter courses, and many of the part-time students, can then obtain their training in agriculture nearer home. When agriculture is a part of the training for teachers in our normal schools, our summer

school for teachers will not be needed, but until these things come to pass, our doors are open to all these applicants. There is no reason why a four-years' course of college grade in agriculture, mechanic arts or domestic science, a two-years' course in practical agriculture, short winter courses in the same line, a summer school for teachers, cannot all be conducted at the same institution. There should be no confusion when the purpose of each activity is kept fully in mind, and proper methods adapted to meet the respective needs. We have no apology to offer, therefore, because all of our work is not of college grade.

Hitherto agricultural progress in the United States has been powerfully influenced by the presence of vast areas of government lands, which were easily secured and easily brought under cultivation, giving large returns to investments. During the last fifty years there has been added to our farming lands on an average ten million acres of fertile land annually. The whole interior of our country has been brought under the plow in the last few decades. Our population, now ninety millions, will in fifty years have increased to over two hundred millions of people. The public domain is now practically exhausted. There is little land left for settlement, and the amount available will provide homes for the increase in population for not more than five years. The arid land possible of redemption will care for the increase in population for five years in addition. With population increasing at the rate of two to three per cent. a year, the surplus of agricultural products, now ten per cent. of our output, will soon be needed for home consumption. It will be but a short time, therefore, when every farm now under cultivation will be required to double its production.

That the rise in the price of land has already affected the cost of food products and living is graphically illustrated by figures recently given by Secretary Wilson: "On the basis of average wholesale prices ten years ago, for so much of the various commodities as could then be bought for a dollar, there must now be paid for milk, \$1.30; for eggs, \$2.05; butter, \$1.52; cheese, \$1.45; peas, \$1.46; potatoes, \$1.52; apples, \$1.91; beans, \$1.63. The growers of wheat and corn and cotton, of tobacco and of hay, come with increases ranging from 23 to 66 per cent. These figures prompt the *New York Sun* to say: "Pleasant for the farmer, mournful for the consumer." The promotion of agriculture, therefore, may well be considered a public policy.

WHAT IS CONNECTICUT DOING FOR THE DEVELOPMENT OF AGRICULTURE?

The last report but one of the Comptroller gives the expenditure of the State per annum as \$3,500,000, in the total which may be analyzed as follows:

Legislative and judicial expense,	\$872,638	25%
Humane institutions,	797,360	22.9%
National Guard,	202,186	5.8%
Road Commissioner,	272,891	7.8%
Penal institutions,	282,103	8.1%
State commissions,	278,120	7.8%
Education,	707,951	20.2%
Agriculture,	81,066	2.3%
	<hr/>	
	\$3,494,315	99.9%

The 2.3 per cent. for agriculture includes the appropriations for both the Experiment Stations, the Agricultural College, the Board of Agriculture, dairy and pomological associations, the Dairy Commissioner, Commissioner of Domestic Animals, agricultural fairs, forestry, deer and fox bounties.

In view of this meagre appropriation for agriculture, one might say, "Mournful for the farmer, mournful for everybody." Mournful for the State when so small a percentage of the total revenue is devoted to the promotion of productive enterprises.

Two and three-tenths per cent. of the total revenue of the State represents an expenditure of \$80,000. This seems a large amount, but it is at the rate of only six cents per \$1,000 of the estimated value of the property of the State. It represents an expenditure of only eight cents per year per capita of the rated population of 1908. It is less than three-fourths of a day's earning of those engaged in agriculture.

The Storrs Agricultural School, now the Connecticut Agricultural College, was established by act of the General Assembly, April 6, 1881. Since its foundation to date, or for a period of twenty-eight years, the State has appropriated for the support of this institution \$515,000. One-half of this amount has been invested in permanent improvements. This is a large sum, yet the amount is \$100,000 less than was appropriated for the single year of 1907 for humane institutions, \$144,000 less than the appropriation for the national guard and \$202,000 less than the appropriation to penal institutions. I do not wish to be

understood as urging a less expenditure for the care and support of the dependent and unfortunate, for the detention and correction of the vicious or for the support of the State militia, but rather larger revenues and larger appropriations in the interest of the productive classes.

DISCUSSION.

Governor WEEKS. We have all listened with a great deal of interest to this paper by President Beach. I know that I have, and I think you will all approve of it. I am very glad that he closed his paper with the words that he used. I agree with him to the letter, that more money should be appropriated for the revival and for the benefit of the agricultural interests of our State. For the short time that I have been in office, if I may use that term, I have given more or less attention to it personally. I am very much interested, and I think with this agitation it will bring it to the minds and the attention of those who have to do with making appropriations. I, for one, am very sorry, both for the State and the people of the little great State of Connecticut, that its penal and corrective institutions should take so much of our revenue. I do not know how we are going to help it. We are so near New York City that this matter of the immigration of penal classes into the State is a very serious one to our State. It is very easy for you to look at the history of our penal institutions, of our insane hospitals, and notice that the appropriation needs to be so large. I am sorry that it is so, but such is the fact. I did not intend to discuss President Beach's paper, but I could not help saying just that word.

There is another fact that I am going to leave with you before we take a recess. A few years ago it became my very great pleasure to listen to a lecture and during that lecture this statement was made that set me thinking. The thought that it suggested I am going to leave with you to think over during the recess. The lecturer made this remark. Speaking of the old, buried countries that archæologists are doing so much to unearth and explore, where they find the cities and towns buried in the sand, and he said it very forcibly, and it was this thought that he brought out more in particular, and which I want to leave with you. He said that centuries ago those same buried cities

had the same privileges, water-courses and everything, the same verdure and forests, the same as we are enjoying today, but they used them up and therefore they paid the penalty, they became dead. That was the result, they became buried beneath the sand. Think that over. Think more of conservation of the resources that we have. I just wanted to leave that thought with you.

The time has come now, ladies and gentlemen, in accordance with your program, for a recess, and without further remarks we will take a recess until 2 o'clock.

FIRST DAY — AFTERNOON SESSION.

Music.

Meeting called to order at 2.15 o'clock, Vice-President Wilson H. Lee in the chair.

The PRESIDENT. I recognize that it is considerable of a fall from the Governor of the State as your presiding officer to the incumbent of the chair. I feel that it is a good deal like going from the sublime to the ridiculous. But I was very much pleased that we were honored by the presence of the Governor this morning, which not only added dignity to our meeting, but I think it served to interest him in what we are doing, and to show him that there is a necessity that this State Board should be well sustained by liberal appropriation from our legislature.

This afternoon and the evening tonight will be devoted to poultry raising. Now I am something of a farmer. I have two hundred or more of horned stock, young and old, but I do not own a feather. I buy my eggs, and I guess it is a good thing for me that I do, for I realized that the more hens I had on my farm the poorer I would be for it. Now that is not for the reason that I do not think there is any money in the poultry business for anyone that understands it, and especially when you have got a man behind the hen, or a good woman behind the hen, it is a good business, and, confidentially, I will say to you, and with all due respect, that it would be a mighty sight easier for a good woman back of the hen than for a man, because I think she can make more of a success of it than he can. Years ago when I lived in the city I always kept hens. I had a small flock that used to do very well, but when I went out on my farm, not liking

them particularly well, or not well enough to get into the game, as the boys say, I realized that the fewer hens I had around the better. When I can find a man like some of the few gentlemen I could pick out in this audience to come over and manage the hen part of the establishment, and live with us over there, then it may be all right for me to go into the hen business, but for the present I know it would be a losing game, and I think I am wise enough to stay out.

Now the first speaker of the afternoon is a gentleman who, for some time, was at the head of the information department of the Sargent Incubator Company. He is well qualified to talk to you upon the subject which has been assigned to him, and I take great pleasure in presenting Mr. Charles F. Stephenson, who will talk to you about the use of the incubator.

Mr. STEPHENSON. Mr. Chairman, Ladies and Gentlemen: It would be presumption on my part, I think, to attempt the instruction of a Connecticut audience of this character upon the subject of the incubator. That is not my intention. Rather, I would bring to your notice some of the little things which in the incubator, like in life, are of most importance, and which when neglected or forgotten cause disaster to follow. I would bring some of them to your minds like an old friend who, in our multiplication of duties, we have overlooked, and perhaps have forgotten, but when borne in mind and brought to our attention we greet them as old friends, and put them in practice and go ahead with added success. With that idea in mind I would like to talk upon incubation.

Let me say first that what I wish to say springs from ignorance, if I may so speak of it, of those who attempt to run incubators. By correspondence all over the United States with people who have been in trouble the information department of the concern with which I am connected, and of which our Chairman has spoken, except that we call it the "trouble department"—and it was that department that I had charge of with the company, found that out to be the case. But my experience comes not only from my connection with that department but from the sale on the floor of incubators, and also from their operation. I speak this way, not to show that I know anything about incubation, for I do not, but simply to show you that I have had the opportunity to meet people face to face and learn from them just what their troubles were, and I suppose it is

fair to assume that there are some people in this audience, at least, who have had the same troubles.

What then is the purpose of incubation? Incubation is either artificial or natural, and its purpose is to produce the very best fowls that we can. Science tells us that the most important part of the raising of children is the consideration of the pre-natal condition, and that is exactly, as it seems to me, the sense in which we should consider these questions of incubation. The incubator, whether artificial or natural, is blamed with most of the fault for failure, and if you bear that in mind you will agree with me, I think. It is usually the case when there is a failure that the incubator, or the manufacturer of the machine, gets the blame for failures. I think you will clearly agree with me if you will think back a moment. The troubles that you have had have been laid to the incubator. We forget one of the main points, to find what stock the egg came from which produced the chicks which we wanted to be good, but which resulted in being bad. We cannot find, all of us, the good stock that we want good, the history of which can be given to us, and which sometimes even when given to us cannot be relied upon, but in selecting the stock we must bear in mind the first primal fact, get the very best stock that we can from the most reliable breeders, whose word can be accepted as the living truth, and from that stock as the basis, breed up to the stock that we desire, which shall produce a progeny that is going to make money for us. The influence that parents have upon the young chicken is of fundamental importance. From those parents will come either health or disease, strength or weakness, or conditions which will render them liable to contract disease when unfavorable circumstances are presented instead of having the stamina to resist and throw off disease. That is a thing that we should remember under all circumstances. It makes no difference what our purpose may be, whether it be for fancy fowls or for table or eggs. One point we must never lose sight of, is the pre-potency of either one or both of the parents. What is the strength which one or both of the parents is to transmit to its progeny, or their progeny, the characteristics which we want to find in the chick, which when it shall have matured will be just what we want? If it be for the fancier, if it be for the table fowl, if it be for eggs, we must be very careful to have so bred that the pre-potent power shall be strong enough to reproduce exactly what we want.

So we come now to the consideration of the egg. How many people really stop to consider what is a good egg when it comes

- to the matter of incubation? Lots of people will take most any old egg, and think if they are only subjected to heat and moisture in the incubator, or under a hen, the chicks will be all that is desired, but if we will stop to consider a moment, it will be seen that we want the very best, eggs that are surely fertile and which are strong and virile. Therefore, we should take those that are laid in the most natural part of the breeding season when the fertility is the strongest, when the strength of the fowls is not being given to feathering or to gathering their strength, or to overcoming some disease, or to getting rid of the effect of close quarters in which they have been kept, or from poor feeding conditions. The eggs that we use, in the first place, should be from birds, or should come from stock that has been well fed, abundantly fed. Not fed on a little grain now and then, not stock that has been fed on a little mash given them, but stock that has been abundantly fed with egg-making food, from fowls which have had plenty of exercise and lots of room, lots of grain, lots of good food. But even with all those conditions in our favor there are many little things that are forgotten, but which are of vital importance. How many times we go through a farm, large or small, and find the drinking dishes empty, a thing that ought not to occur. I see nods of approval on that. I am glad there is one point which reaches you. Fowls that have been mated wrongly in the proportion of males to females, or rather of females to one male, bring us to a point which should be very carefully considered. It depends largely on the breed which you are using. The proportion should be right in any event, but the strength of the breeds differs somewhat. Then too we should be very careful with the stock, and see to it that it is stock which has had plenty of room for good healthy exercise.
- It is very much better to give them too much room in their breeding quarters than it is to give them half enough room.

Now in the matter of the formation of the egg,—let me call your attention to a fact or two in regard to eggs, both before and during incubation. You know, all of you, that the egg has two sets of veins, and the sack which contains the fluid in which the germ floats. Now some people will go ahead and use or handle eggs very roughly, or handle them roughly in turning them, so that they become practically unfit for incubation. They will drop them or move them around without any thought whatever that inside of the eggshell there exist veins, blood-vessels, upon which the life of the chick will be dependent, and which, if any of them are broken, or if the sack is broken, death to the embryo

may result. People do not stop to think of that. Yet it is true. So when you are putting away your eggs for incubation, please remember to handle them, every one of them, very carefully.

Then too, some people are apt to overlook the importance of using fresh eggs for hatching purposes. People say, oh well, it doesn't make any difference how long eggs are kept for incubation. Perhaps that may be true, yet it is a fact that if eggs are kept more than one week they begin to deteriorate, and after that the process of deterioration goes on more rapidly. It is true that in some cases eggs have been known to keep five weeks and still give a fair hatch, but that is an exception that proves the rule. Eggs should be kept where there is a cool temperature of from forty to forty-five degrees. Better not let it go below that or much above that, because experimentation has shown that incubation begins at a temperature of fifty degrees. After incubation begins, if the process progresses considerably or progresses a little and then is stopped the germ is likely to die. More frequently it will die than live and hatch. After eggs have been kept and properly handled, we then take up the question of incubation itself. You will find that after the incubation has progressed for three or four days, if you look through the egg tester you will see that the sides of the veins show very darkly, so as to almost make the yolk of the egg opaque; beginning with the third day and so on, growing gradually darker and darker until, by the fourteenth day, the egg should be entirely opaque. These veins continue to develop that color during that process of incubation. The saying is that these veins float and turn back, but whatever may be the fact about that, they are of the utmost importance, because they give nourishment to the embryo during the first few days, or usually up to the fifteenth or sixteenth day. Hard usage of the eggs during this time will usually result in the breaking of the veins and hence the killing of the embryo. Therefore, you should be careful during this period, particularly careful in the way you handle the eggs.

Now in the matter of incubation, let us imagine for a moment that we have an incubator before us. Let us see just what is to be done. It will take only a moment. So many mistakes are made right here that I have presumed to call your attention to it, and emphasize this part of the subject. Let us suppose then that the incubator stands before us. We will assume that it has been set up. The first thing to do is to raise the indicating rod, and let it fall back so as to see if it binds anywhere. The im-

portance of that is in the fact that if it does bind we want to discover it, because we do not want that there should be any friction of the regulating arm which raises and lowers the disc, and thus prevents the distribution of the proper quantity of heat throughout the chambers. If this is all right, then examine the little square ball that is always upon the left end of the regulator arm, to see that that has not been moved. If you find that the little disc hangs directly over it and covers the hole from which the hot air escapes into the room, then you can go ahead and put your heat in, and that brings us to an important point. It probably is the most important part in incubation, and that is the lamp. It would amuse you perhaps, as it has me, if I were to stop at this point and tell you how many questions we sometimes receive just on this point alone. The questions come into the trouble department day after day, sometimes thirty or forty letters pile up, all saying: "What is the matter with my lamp? It smokes." I wonder how many of you have had smoky lamps. Will those who have please raise their hands? Well, some of you have. Is it the fault of the lamp or is it the fault of the user of the lamp? I will say that it is never the fault of the lamp, because when the lamp leaves the factory it is in perfect condition. It is the fault somewhere between the manufacturer and when it gets into the hands of the user, or the operator of the incubator. When you go home and you want to start your incubator, you find that the lamp smokes, and you wonder whether it is going to smoke this time. Let me tell you what to do. Clean up your lamp, put in a new wick, and fresh oil of the best quality. Even look and see if the chamber of the burner, the flat part that extends around the cap, see if that fits up close and tight to the bottom of the lamp flue. If it does, all right. Then see if the little piece of mica in front of the flue is fastened in tight. If it is, all right. If it is not, put in a new one. Always keep it clean so that without any difficulty whatever you can immediately see by looking in just what condition it is in, how high it is, and so on. Still your lamp may smoke. And here comes a very common source of trouble, that is almost never found out by a person who uses an incubator, and that is the fact that the wick tube may be just a little bent, so that the flame as it rises will strike against the places in the burner of the lamp and smoke, and the more smoke, the more rapidly will your little flue in the side part clog up and continue to clog up until finally you have got a very bad heater. Sometimes if you let the lamp fall, or let something fall which strikes upon

the burner it becomes a little indented, so much so that the flame will strike against that particular place, and then you have another smoky lamp. I presume that of all the complaints that come to the information department of the incubator company that lamp complaint will constitute fully fifty per cent. if not more, of the total number. The trouble that I have just mentioned is perhaps obscure, and perhaps some of you have never heard of it before.

Then when we have gone that far we must test the thermometer. Have you a clinical thermometer at home? If you have, try it. If not, perhaps you can get one from a local doctor, so as to test your own thermometer and see if it registers the same. Then take care to see that the hot water is mixed up in different parts, so as to see that the different temperatures within the water shall be equalized. That is all very important. Thermometers when they are sent out by the companies with glass are apt to vary somewhat, but that is no reason why they should be changed, because the glass does change. It will perhaps vary quite considerably. Sometimes a thermometer received from an incubator manufacturer will vary from one-half to five or six degrees. I have known of instances where they would vary as much as eight degrees. Always test your thermometer, but do not blame the incubator manufacturer because you get one that is too high or too low, because they have done all they can. Then if you run your incubator properly, according to the directions of the incubator manufacturer, you should have good success all the way through.

There is one point that I wish to correct, which some manufacturers will insist upon in their directions, and that is never to change the regulation of your machine. Now the regulation of the machine for many people has seemed to be a difficult thing, but I want to tell you one thing, and if you will follow that I think you will have no trouble. If you will remember it I think it will aid you. After the machine has been warmed up, and before you put in the eggs, the temperature having been for the day $102\frac{1}{2}$ or 103 , whichever you decide upon to begin with, open the door of the machine, let it hang down and stay that way until the temperature within the machine is shown by the thermometer to be ninety. It cannot go much below eighty-five, because the thermometer ends at eighty-two or three. At that time when you have lowered the door the disc should have been raised about an eighth of an inch, and the thermometer should have registered $102\frac{1}{2}$ or 103 . After the temperature has

gone down, close the door, and then go away for three or four hours and forget you have an incubator. At the end of that time go back, and then after opening the door see what the temperature by the thermometer is. If the temperature is the same, same as you set the machine, and the disc is right, being one-eighth of an inch above the flue, all right. You can adjust it by the thumbscrew at the top, and then repeat the operation for two or three times after that until you can do it every time. By that simple expedient, adjusting it with the thumbscrew, you can quickly adjust it. It never fails. I advise you, however, never to put your eggs into the incubator until you can bring that condition about.

Some manufacturers will say never change the regulation of your incubator after the eggs are put in. I do not know why they should say it, but they do. About the twelfth day the eggs, if the incubation has been correct, the embryo of the eggs will have reached their maturity, but not their full size, and then the amount of animal heat which will be thrown off will raise the temperature considerably, and you must take care of that by the regulation of the machine. It is well to look after that every morning. I suggest that you do it in the morning because you can watch it then during the day. It is better to do it then than at night because you cannot watch it as well at night. You may have to do that for twelve, fourteen or fifteen days, but ordinarily it should not go beyond the thirteenth day.

One other point is in regard to the cooling of the eggs. It is a little point, but one of considerable importance to success. If you go into an incubator cellar sometimes you will be surprised at some things you will see. I went into one not long ago in which there were fifty odd incubators in operation. There were some trays on top of them cooling. I said to the man in charge, "What is your guide for the cooling of the eggs?" "Oh," he says, "by the feeling of my hand." I talked with him a little about it, and he said he thought that was all right. Well, as a matter of fact, it is all wrong, because you know that the hand becomes benumbed, so to speak, so that it is not very sensitive to different temperatures with which it comes in contact throughout the day. The hand is not sufficiently sensitive, but if you will take an egg, after the eggs have been on top for a little while, and just touch the edge to your closed eye-ball, you will find it always right. You can tell very readily whether they are sufficiently cooled. If you find that they are a little cool, put the eggs right back. That is always a sure test.

Another thing: When you handle your eggs be very careful to see that your hands are perfectly clean. I mean by that to be sure to turn the eggs the first thing when you go into the place where your incubators are. Always be sure to do that, because, if you first take care of the lamp, your hands will have more or less oil upon them, and by doing that day after day you will soon get the eggs into such a condition that the vitality will be lessened, owing to the stopping up of the pores of the shell, and a poor hatch will result.

I have found with most farmers that a large proportion of the troubles which they have with incubators come from cooling, and from the testing of the eggs. People would write to us in answer to a long list of questions to get at the bottom of the trouble. Among them we always had this question: What was the temperature of your room? And we usually got back an answer showing that the temperature was forty, or forty-five or fifty degrees, sometimes sixty degrees. Now stop and think a moment, friends. That egg in which there is a living embryo is in a temperature for the greatest part of the time of 103 degrees, possibly $103\frac{1}{2}$, and like a flash you take it and subject it to a temperature of forty, or forty-five or fifty degrees without covering. Why, if you and I were subjected to as sudden a change as that without proper covering it would make us shiver, and yet you would be surprised to see what a large number of people do that. That is another little thing to remember, but it is one of vital importance to success.

Mr. Chairman, my time is up and five minutes more. I thank the audience for their very kind attention. (Applause.)

DISCUSSION.

The PRESIDENT. This is an interesting topic, and I have no doubt there are some who would like to ask some questions. Would the audience like to ask any question?

Mr. COSGROVE. I would like to ask a question of the speaker. I notice that when you set eggs under a hen that after a week or ten days the eggs get shiny all over. They look very different from those put in an incubator. Has that anything to do with a material put on by the hen or which gets on from the hen's body in any way? What is the cause of that shiny appearance?

Mr. STEPHENSON. I cannot tell you the cause of it. I can

simply state this fact. I have made a good many tests along that line, and have found that when the incubator egg made a good hatch the eggs have always looked shiny. When I have called my wife's attention to that she has said, "Why, they look just exactly like hens' eggs. I have heard people say that the shinny appearance comes from the oil of the feathers of the hens, but I cannot believe that is the case in an incubator, because an incubator is not built that way.

QUESTION. Some people believe in cooling the eggs by leaving the door open and not taking them out. Is that a successful way to do? Do you advise that?

Mr. STEPHENSON. There are two reasons why you should not do that. One is that the eggs in the front half of the tray are cooled much more rapidly than those inside. The second thing is, you are wasting that much oil and that much good heat. The better way to do is to take them out and close the door, and in that way keep the heat until the eggs have been cooled sufficiently.

QUESTION. Do you think there is any harm in washing eggs before putting them in?

Mr. STEPHENSON. No, sir.

Mr. WAKEMAN. You spoke of taking them out in a room where the temperature was too low. In case it was more convenient for a man operating only one machine to have them in a room where the temperature was under sixty, what process would you follow of covering, or how would you have them protected from the temperature of the room when the eggs were being cooled?

Mr. STEPHENSON. The ideal temperature in which to keep the eggs is about that which they have been used to before being put in. That is the ideal temperature, provided you have the proper amount of moisture, but if your machine is in a room of that kind, where the temperature is sixty, it is very much better, and I think always safer to heat a flannel bed blanket until it is warmed up to 103 or more, and then fold it and wrap the tray bottom and top, excepting one-half. I assume that you are using an incubator that has two trays in it. I would do that. Cover one-half of the tray. I would take out only one tray at a time, and cover one-half, bottom and top, because the bottom of the egg will cool as rapidly as the top. Have a good

strong light with a reflector behind it, and that will throw a light clear through the egg. One of the best egg tests is to use acetylene gas, or the light produced with carbide. That will give an excellent light with a good reflecting power. You can size up the incubation in one day by it, and you can work very quickly with it.

QUESTION. I think the speaker must be in league with the incubator men. He tells us that we have no right to kick if they send the incubators out with thermometers that vary. I do not see why they should send out incubators with thermometers that are sometimes as much as six or seven degrees off. Why do they not test them before they send them out?

Mr. STEPHENSON. Many of them do now. During the time that I was connected with the Cyphers Incubator Company they had that complaint many times, and in some cases had some trouble by it, so that now they test their thermometers before they are sent out.

Mr. COSGROVE. I have a 360-egg incubator, with a hanging thermometer that hangs up about half an inch or more above the eggs. The instructions are to run that at 103, but I have found that when I set a thermometer that rested on the eggs that when it got to 103 the hanging thermometer was 105 or 106. Now what ought I to do? Should I be guided by the thermometer that rests on the eggs, or run it, as the directions read, at 103 by the hanging thermometer?

Mr. STEPHENSON. It should be 103 by the suspended thermometer always, except in some cases where the principle on which the machine is made differs.

Mr. COSGROVE. Sometimes the contact thermometer will not show over 101 or 101½.

Mr. STEPHENSON. I know that is so.

The SECRETARY. I understood you to say it was not wise to change the temperature of the eggs too quickly when you are cooling them from 103 to 40 or 50. When the old hen comes off her nest doesn't she allow them to change temperature very quickly?

Mr. STEVENSON. Exactly.

The SECRETARY. Isn't it wise to follow the habits of the old hen so far as possible?

Mr. STEPHENSON. Yes, sir ; but you must bear in mind that we cannot always follow the hen exactly in all of her methods. With an ordinary good setter, if you will test the temperature of her eggs in some ways as I have suggested for an incubator, you will usually find that the hen knows when they have cooled sufficiently. You will usually find that the eggs have not grown too cold. That old hen is usually blessed with an instinct that it would be good if some of us had. She appears to know when it is just right to go back to the nest. You will find that to be the case usually, I think.

President LEE. I have a neighbor who lived in the city. Two or three years ago they took a place out in the country. They took a man with them and, being a city man, he naturally studied the farmers' conditions. He said to this lady the other day, "Mrs. Corbin, the farmer makes more money when he is selling his eggs at twenty-five cents than he does when he sells them for fifty cents," and she says, "How is that?" "Why," he says, "when he is selling them for twenty-five cents a dozen he has plenty of them, and when he sells them for fifty cents a dozen he doesn't have any." Well, that is my condition. I mentioned the fact that I used to keep hens. I was born and bred in the country, and always having had plenty of fresh eggs on the farm I never could put up with anything else. When eggs were fifty cents I thought I could make them lay, but I didn't always do the trick. There was a very good woman who could do the trick who lived within some three or four miles of us out in the country, and where I could always go and buy fresh eggs. Somehow or other she was always able to get them when there was none to be obtained elsewhere. It takes a woman every time to get the best results for a flock of hens. My experience with her was one of the best lessons that I had on woman's ability to handle hens. Now you gentlemen here have made more or less of a success in farming, and I feel that perhaps you know a good deal about it. Certainly a good many of you know a good deal more about it than I do, but I want to say, gentlemen, that there is not a man in this room that has made a success of farming, or any kind of a success, unless he has had a mighty good thrifty wife to do her part. (Applause.) There may be two or three bachelors here who

have made something of a success, but their success would have been a dozen times greater if they had had that thrifty wife.

Now we have with us this afternoon Mrs. Mollie Mc. Allen, who is going to talk to us on "A Woman's Success in Poultry Culture." She is an institute worker in New York state, who is well qualified to talk to us on that question. She is a modest lady. A little while ago I told her that there was some complaint this morning about our speakers talking from the floor, and I was going to ask her to take the platform. She says, "Don't do it," but in spite of her objection I am going to ask her now to come right up here where all of these gentlemen can get a good look at her. (Laughter.)

Mrs. MOLLIE MC. ALLEN. Mr. President, Ladies and Gentlemen: There are two or three reasons why I should not like to go on the platform. One of them is, those yellow chrysanthemums which decorate the platform do not correspond with my complexion. Another is I see that you have a stenographer present, and I want to be where he can hear.

President LEE. We will put him right up on the platform with you, if you say so.

Mrs. ALLEN. Oh, no, I thank you. I would rather stand here.

President LEE. Or we will remove the chrysanthemums.

Mrs. ALLEN. Really, I think I would like to get down among the audience, if you will let me. I am sure I can make you hear better down here. I am sorry in the first place, that the title placed upon the program, "A Woman's Success in Poultry Culture," is not quite the way I would like to have it read. The word "success" should read "experience." "A Woman's Experience in Poultry Culture." I do not wonder, however; that the title appears wrong on the program, for if you could ever see my handwriting you wouldn't wonder at anything which appears. At any rate, my experience in poultry has not been entirely successful. I have been breeding fowls with some success but with many a failure. I believe that my failures have taught me more than my successes. Therefore I want to tell you today of some of my failures as well as about some of the successes which I have made in poultry culture. There is one thing I am going to ask the audience to do and that is, I would like to have each one who is

keeping thoroughbred poultry to hold up their right hand. I think there are more hands up in proportion to the audience than any other I have spoken to before. It is a happy omen. Now I am not going to talk about thoroughbred poultry from the fancier's standpoint, nor from the showroom standpoint, but from the point of view that thoroughbred poultry brings in more money to the farmer than any other kind of poultry which you can keep. You can get more money from the sale of white or brown eggs, whichever the market demands, from thoroughbred birds than you can for mixed eggs. You can get a higher price for broilers in the market from thoroughbred stock. In Oswego I get two cents above the market price for my thoroughbred broilers more than I could get for broilers from mongrel stock, with which, unfortunately, I had to start.

Some urge against keeping thoroughbred stock as compared with mongrel stock that it is much more expensive, that you must have a model building in which to keep the stock, etc. Those who are keeping thoroughbreds may not be so much interested in this point, but I beg their indulgence for a few moments while I tell you a few of my experiences in going from mongrel stock to a flock of thoroughbreds. You can go back to your neighbors and tell them what I say, and I am sure if there were any of them here who are trying to work over their flock they would go back to their neighbors and encourage them in that work, for it means better poultry and more poultry. When we went on the farm, after the farming implements and the horse and what stock we kept were bought, I found that I had only eight dollars to begin my poultry work with. Now eight dollars will not buy very much thoroughbred stock. I wanted first, however, hens to lay eggs to raise broilers for market. I could not buy thoroughbred stock enough to answer the purpose and therefore I was obliged to begin at the bottom and begin with mongrel stock. I bought twenty mongrel hens of all sorts, colors and descriptions for five dollars and then I found a bargain. You know how dearly a woman likes a bargain. Well, I found one. I found a thoroughbred bronze turkey and got him for three dollars. I do not believe that many of you will find such a bargain as that. Well then, you know, the poultry papers have been telling us, and the authorities also, that if we have thoroughbred poultry they must

be kept in a model building. Well, I think that my poultry house comprises more of the "Don'ts" of poultry house construction than any other in which I have set my foot. It is an old made-over granary. Never was intended for a poultry house in the first place. I do not believe you have any more of them in Connecticut. I have seen very few of them in New York. It is a building with the walls sloping out so that it will catch all the dust possible on the inside. When we went there the man had been using it, or rather abusing it, for a poultry house; it was in wretched condition. There is a basement under it and in that basement he had his hens. He expected them to thrive in such a place as we found there. On the next story there was quite an elaborate system of nests. All sorts of devices. On the third story he had his sleeping chamber. They went upstairs to bed after their duties of the day were done. That house was covered with tarred paper which had been on for several years. It was so old it did not even smell of tar any more; it was in a state of almost indescribable filth, just simply alive with vermin, and certainly was not a place which appeared very encouraging for success in poultry culture. It took us I know not how long to get it cleaned up. We drew out load after load from the basement and, among other things, we found bones, great long bones, corncobs, lots of straw and even dead turkeys. There were some young turkeys and one or two old dead hens. I have often thought when at home in looking at that building, how, with a poultry house like that, any man could wonder why his hens did not lay. Why, the poor things could not manage to live, to say nothing about laying. After we had cleaned it out and torn out the tar paper, the elaborate trappings and everything else, we stopped up the cracks and fumigated with sulphur, and then we whitewashed with a mixture of whitewash and carbolic acid, and let it dry. And do you know, even to this day, that place is sometimes troubled with vermin. I cannot keep them entirely out. I say this because I want to say to those who are building henhouses that I advise them to build them, so far as possible, without any cracks or crevices. This building, of course, as I have said, was constructed for a granary and, although we gave it a thorough fumigating and whitewashed it, we have not been able to get rid entirely of the mites. We can keep them down

by kerosening the perches each week, but have not been able to rid the building entirely of them.

About the tenth of April we installed our flock of twenty mongrel hens. I am going into a little detail in order to show you how I worked from those twenty hens into thoroughbred stock without paying out a dollar except money which the hens brought in. Anyone can do the same thing if you have the mongrel stock for a foundation. I heard Mr. Ayer, one of our American Poultry Association men, say at an institute one time that no one could make a success or could make any money by keeping mongrel stock. After he was through speaking I arose and gave these details which I am going to give you in a moment, which proved to him that I certainly made a profit from keeping mongrel stock, and he got out of it by saying that it was a woman did it; that no man could do it. (Laughter.)

Well, from the tenth of April to May I sold \$3.16 worth of eggs beside those that I used on the table and those that I put under a hen. She kept on setting and she raised ten little fluffy chicks for me. I have made no account of the eggs or poultry which we used on the table, because I consider that was pay for the work. I have not charged the hens with labor, neither have I credited them the eggs, fowls and broilers which we used on the table — for if we leave these in you would soon see that they pretty thoroughly paid for all the labor which they cost. About that time a friend, a farmer in the vicinity, who had been using a 200-egg incubator, offered it for sale. Well, you know that fools rush in sometimes where angels fear to tread. I had never had any experience with running an incubator, but I thought I could do it. I was green in the poultry business. We know a whole lot more about poultry when we start in than we do usually after several years. Fortunately, I am blessed with a husband who is a mechanic. We bought that incubator. He investigated the wiring and found it was bent. That, of course, saved us some trouble. He soon straightened that out and we ran it for two or three days and then started in with eggs. I had a little bit of Scotch caution, and I did not fill it with two hundred eggs to start with. I put in sixty. I hatched twenty-eight chicks. There were only forty fertile eggs. The next time I learned something from that failure. We started the incubator again

and put in nine ducks' eggs, thirteen turkeys' eggs, ran it a week and then filled it up with 170 hens' eggs. From that experience I discovered that it would not do to put in all sorts. I did not hatch one single duck. I hatched two turkeys and 115 mongrel chicks. At the same time I had set about using this incubator for the purpose of raising broilers. I put under my setting hens some thoroughbred eggs which I had bought. There were thirteen Buff Leghorns and thirty-nine Barred Rocks. I was experimenting to see what kind of breed was best for my purposes. I did not know very much about thoroughbred stock, but I had found from my earlier hatches that the hawks and crows, which are quite numerous in my part of the country, took off the white ones more rapidly, so I confined myself to dark chicks. I found also that the Oswego market called for heavy broilers of from two and one-half to three pounds and that it always preferred the brown ones. You know we have to be guided a good deal by our market conditions. So I just have the thoroughbreds which I hatch, the barred Plymouth Rocks. Here was another little bit of discouragement also which I met with at the time, for out of those thirty-nine eggs I hatched twelve chicks and seven out of that twelve were cockerels. One pullet broke her leg before the summer was over, the horse stepped on her, I believe; but I had too much Scotch grit to give up as easily as that, and so I kept at it, and my thoroughbred stock, such as I was able to produce, I used for breeding stock. But I was going to tell you how much I made that year out of those twenty hens. I sold from those twenty hens \$34.70 worth of eggs. I raised eighteen turkeys. I kept four of the very best hens for breeding purposes and sold the rest of the turkeys for \$20.76. From the broilers I received \$33.05, and collected from the tenth of April to the first of January on those twenty hens, \$48.89. That is not a large story. I am not here to tell large stories. I cannot tell you about any nine-thousand-dollar building or keeping fancy poultry, but I can tell you of a fair profit made on a farm with poultry, starting with ordinary mongrel stock and working along into a thoroughbred flock.

The next year I raised three hundred chicks and sold 9,642 eggs, amounting to \$158.80; broilers, \$81.34; fowls, \$17.95; and forty-one turkeys, \$74.74, or a total of poultry products sold from

about seventy hens and four turkeys, \$332.83. The food cost me \$146.16. I cleared from just an ordinary farmer's flock of about seventy hens, \$186.67.

Owing to a change of circumstances, the next year I did not raise so many broilers. I was obliged the next year to take entire charge of the whole farm, and you know you cannot spend a great deal of time with poultry on a 107-acre farm. So I simply raised enough to replenish my flock of Barred Rocks. I want you to notice that where you have thoroughbred broilers and the pure-colored egg, what a difference it makes. Not in the number of eggs laid, but in the price. That year I had just about the same number of hens, about seventy. You will notice also that they averaged just about the same. They were kept in one flock. They laid 11,682 eggs instead of 9,642. I sold 910¼ dozen for \$210.34. Two geese, \$3.92. Twenty-four fowls, \$16.10. Thirty-six turkeys, \$67.34. I sold twenty-eight broilers at \$28.05. You see that is a good deal higher than the other broilers brought me. It is a good deal more for broilers, as you will see, than the mongrel stock brought. You can tell when your broilers are going to be ready, and you can always contract to sell your broilers ahead because you can rely upon them, if they are thoroughbred stock. Your customers know just when they are coming, and they are better in every way; while, if you have raised mongrel stock, you do not know what to expect yourself until you get the feathers off. The total that year was \$324.75. You see the total sold that year, although I did not raise anywhere near three hundred, was almost the same as the year before. This year it was \$324.75. The feed cost me more. It was \$164.84. Feed has been rising every year. The gain was \$166.11. I shall have to tell you why that gain was cut down. That dread disease, the blackhead, broke out in my flock, and in consequence of it I lost about half of my flock of ninety turkeys. They were almost grown for table purposes, so I lost not only the sale of the fowls, but the feed which they had eaten up to the time, which was quite a bit for forty-six turkeys.

I do not know as I should tell you the details of my struggle with that outbreak of disease, and I hardly know what you would like to have me talk about the most. I have had my own way so far and said what I wanted to, but now I am going to let you

choose a subject for me if you will. I do not know as I can talk about it, but I will try, if it relates to poultry. There are so many subjects arising, subjects like the feeding of chicks, the winter production of eggs, and the care of fowls for the production of winter eggs, so many subjects, that I hardly know which one you would be interested in the most or would like to have me talk about, and I am going to let you suggest your own subject.

Mr. COSGROVE. I have heard it said that you could not keep turkeys and hens on the same location; that there was a parasite which made it unwise to do that. Although it did not do much harm to hens it was fatal to turkeys.

Mrs. ALLEN. That is what I discovered, but I do not know that the hens were to blame for it then and I do not believe they are today. Shall I tell you about that flock?

President LEE. Yes; I am sure the audience would be glad to have you.

Mrs. ALLEN. I did not know anything about the disease, but all at once I found my fowls drooping and dying. I lost a half when most of the flock were pretty well grown. I found the principal symptoms that were present was the yellowish character of the droppings, and I had rather made up my mind that it was a liver disease. I began and dosed those turkeys with calomel. After I had dosed them pretty thoroughly I gave them some tonic to help brace them up and I am sorry to say that I saved some of them, because it is a germ disease, and the germs remained in the bodies of those fowls to be distributed all over the farm after they recovered. There was nothing written on the subject that I could get. Finally I wrote to the experiment station, and I got an inkling from the Rhode Island station that my turkeys were suffering with blackhead. While my turkeys' heads were not all black, they sent me a bulletin and from that I decided that blackhead was what was the matter with my turkeys. They did not know what caused it then and only surmised that it was a germ disease. Of course, if it was a germ disease, I was afraid it might be contagious, and so I fed those turkeys so that it was absolutely sure there was no contact of any kind with matters that should not be in their feed. They could not come in contact with their feed so that any of the droppings could get into it. I was

very careful about that. I dissected some of them and I found in a good many cases that the spleen and intestines were enlarged; that is, that the walls were thickened, and I began to believe that it was an intestinal disease first and then became a liver disease. After they had reached a certain stage there were spots on the liver, a sort of orange red. I asked some of the authorities if it would not do them good to give them some sort of disinfectant which would clear the intestines of the germ, and they said that I couldn't give the turkeys anything that would kill it, but they changed their minds about that later. As I said, I fed those turkeys so that by no possibility could the droppings come in contact with their food. I separated every turkey which showed the least symptoms of the blackhead and took all the pains I could to prevent the spread. If I found that one of them had the disease or if one of them died from it, I either buried it deeply where by no possibility could any of the others come in contact with it, or burned it. Gradually I was able to eliminate the disease from my flock. I did it largely by breeding up. I did what I had tried to do before, but I took more pains about it, and it is what we all should do, no matter what we are trying to breed, and that was, I selected the very best stock we had on the farm for breeding purposes; the very strongest. I know it is a temptation when it comes along about Thanksgiving time and turkeys are selling anywhere from twenty-five to thirty cents a pound, to sell off the best big turkeys, but if you do you are in the long run taking money out of your pocket-book. Those are the very ones which you want to use for breeding purposes, the big, strong, healthy, vigorous ones, that have been healthy and have the power to resist disease. I did not give those turkeys any medicine. I selected the very best birds, disinfected their runs with carbolic, and fed them where they could not get in contact with the germs, and in that way bred that disease out of the flock. Although they ran with the hens they did not go into the henhouse, but they came in contact with my hens on the farm and ran over the same ground, but they never have contracted the disease since. In my judgment, it is a question of vitality in the breeding stock, the ability to resist disease.

Now I have talked much longer than I ought to have talked. Are there any questions?

DISCUSSION.

The PRESIDENT. I think there are some in the audience who would like to get information on some of these points which you have brought out.

QUESTION. Tell us how we are going to get eggs at this time of year when they are selling for fifty to sixty cents.

Mrs. ALLEN. I learned on consultation with the poultry papers that there are several different methods of keeping fowls for winter egg production. Of course, if there was just one right way, and we each of us have different circumstances and different breeds, with different environments to contend with, it is a little difficult for us to apply that to each individual case. As I told you, my henhouse violates all the "Don'ts" of poultry house construction, and some other problems which you perhaps may not have, but I can tell you about. In the first place, I am going to speak of that problem of feeding for winter eggs. Sometimes you hear people say not to give fowls any water. That is a mistake. So I am going to tell you to be sure to have water where your hens can get it, to have plenty of pure water where your fowls can find it easily. Really, I consider it of great importance in the production of winter eggs. Pure fresh water. Do not give your fowls any water which you would not drink yourself. Always give them pure water. That is a safe rule to follow, because a great many of the germ diseases which decimate flocks come from the use of impure water in the henhouse. So I say, first of all, give pure fresh water. Now I do not care whether you warm it or not. I have a suspicion, it may not be a certainty, that the hen rather have her drink cool. I know I would, and I think the hen is just like us human beings in that respect. I have put down two jars of water, one just warm and the other cold, and I found that the hen would go to the cold jar every time. Of course, in the basement of my henhouse water does not freeze, so I can use cold water in it. The temperature of the water does not make so much difference, but the purity and quantity of the water that you have does make a considerable difference. Always have it so that the hens can have some water. Then there are two or three other things that are essential to winter egg production. One of these is grits. I do not know

what a hen does with grits. There was a discussion in the poultry papers about two years ago upon the question of what a hen does with the grits. Well, I do not know as it is essential for us to know absolutely what she does, but we know this, that she needs grits. Personally, I do not care whether she makes feathers or eggshells, but whatever she does she needs grits, and if you are going to be successful in getting winter eggs you must furnish grits. If you want to get the highest egg production you have got to feed your fowls grits. Oyster shell is good, or anything else of that character. If you neglect this, you will not get the highest production, and that is what you are working for when eggs are selling at from fifty to sixty cents a dozen. Of course, we all know that eggshells contain lime, and we must have lime for the hens in some manner.

And then there is another thing that is essential. If you are feeding your flock heavily, it is a good thing to have some charcoal about. Charcoal will correct many of the digestive ills which are liable to follow from the high feeding of fowls, and especially those which are confined. If they do not get the proper amount of exercise, digestive troubles are apt to come on and charcoal helps to ward these off. And, by the way, if you have weather like this in Connecticut you do not need to confine your fowls very much. I always let my fowls go outdoors if they want to. If they can go outdoors, I have always found that they will look around and get on the sunny side of a building for fresh air. Charcoal, grits, oyster shells, I keep in hoppers, so that they can help themselves. There is another thing which I keep in the hopper, and that is mash. I call it mash for the want of a better name, but it is a mixture of ground grain and beef scraps, which is recommended by the Maine experiment station. I have used it for several years. Perhaps most of you know about it. The formula is 200 lbs. of wheat bran, 100 lbs. of middlings, 100 lbs. of corn meal, 100 lbs. of gluten meal, and 100 lbs. of linseed oil meal, and 100 lbs. of good beef scrap. Now by good beef scrap I mean good beef scrap. I do not mean scrap that is only fit for fertilizer, and which is not fit for a respectable hen to put into her stomach. I think some of us are too careless about the way we feed our hens. We feed them too many times things which are not good for them. You take beef scrap, and if

you feed scrap which is in a state of decay it simply causes disease, and if it does not cause disease to an extent sufficient to make the birds sick, it still lowers their vitality and operates against them when the breeding and laying season comes on in the spring. I changed to dry mash. I used to feed a wet mash, but I found it was a lot of work to get it ready and there were some things about it that I did not like. Finally, I found a man who was getting about the same result from feeding dry mash and I changed over. There is a bulletin which is published by the Cornell Experiment Station, which any of you can get for the asking, showing some experiments which they made two or three years ago with feeding fowls with different kinds of feed, with dry mash and wet mash, and they found that the feeding of dry mash, kept in a hopper before them all the time, produced the best result in eggs, and more eggs than were produced through other methods.

I think there is one thing which I have not mentioned yet, and that is the grain. The grain I feed to my fowls in the litter. I have the floor of my house covered with litter and then throw the grain in the litter and let them scratch. I keep the grain there for them all the time so that by simply going to work they can obtain something to eat. A good many, I know, are pretty apt to throw up their hands at the idea of giving a hen all she wants to eat, because they say it makes them too fat, but where there is one hen too fat to lay there are 999 hens that are too poor to lay. They are sometimes so poor that they simply cannot produce an egg because they have not got the materials in their body to produce it. A hen may be fat and not lay eggs. I do not believe it is the hen's fault. I think it is the fault of the way in which she is fed — because she is not fed an egg-producing ration; or it may be that she is not of a breed which produces eggs prolifically. That is one reason why farmers do not keep more thoroughbred stock. They cannot get the right stock because the fanciers pay more attention to the production of feathers than to the production of eggs. I believe that the fanciers will have to breed for egg production as well as for feather production in order to have a good market among the farmers. People often say that you must feed a balanced ration for eggs; that is, that you must give so much of this and so much of the other. Well, I believe that a

hen knows better what she needs than I do, and I simply give her a variety and let her make her own selection. I feed wheat, corn, buckwheat, barley and almost anything that will produce a variety, but there are two grains which I endeavor to keep before them all the time, and those are oats and wheat. Oats are a wonderful tonic for fowls, and there is something about them that will put cackle and egg-laying power into a hen just the same as they will put trot into a horse. They cannot digest oats in great quantities. There seems to be something about the hulls to the oats which makes it difficult for hens to digest them, but nevertheless those hens want some oats. The hen knows pretty well how many to eat. You watch them and you will find that they will eat a few every day. The other grain that I spoke of was wheat. It is a very nourishing grain. It is good for fowls, and, when wheat is fed, if the other conditions are right, there is usually no falling off in the egg production. For winter egg production I want some wheat.

Then there are some other things besides food which have a bearing on the question of producing winter eggs. Stock that is selected or bred for the production of winter eggs must be surrounded with the right conditions, and I mean by that good condition of the henhouse itself. Ventilation is an important consideration. The henhouse should be kept clean. Do not neglect that. Keep your henhouses clean. The hen is naturally a clean animal. Filthy henhouses will always lower the vitality of the flock and cause less egg production. I do not like to have a draft in the house and I do not believe that hens enjoy a cold draft any better than we do. We want to keep our hens from having drafts upon them and yet at the same time we want to keep them where they will have plenty of good fresh air. I have overcome that difficulty in a way. I suppose most of you have, and that is by the use of the muslin curtain system of ventilation. When I first began keeping fowls in that basement I found it was damp. I thought it would be doing the hens a good turn by building a fire, and so I put a stove in there, and began to run a fire for the benefit of the hen, thinking that by providing warm, comfortable accommodations for them I would increase my egg production. I found that those hens began to snuffle around pretty soon. They began to have colds and I found I could not

keep the fire there at night. In the daytime when I was up and around I could keep the fire all right, so that the temperature would be all right, but I could not sit up all night with the flock for the sake of taking care of the fire, and the result was that while the house was warm and comfortable through the day it cooled off through the night, and there was too great a difference of temperature between the night and the day, and the fowls suffered in consequence. Yet if I did not have the fire the house was damp, and I did not know what I was going to do until I found that somebody had tried the use of a muslin curtain. And so I put muslin curtains on my henhouse and I never have had any trouble since. I have plenty of fresh air, it stops the draft, it dries out the dampness, and the hens seem to be happy and healthy with that kind of ventilation.

Now are there any questions?

QUESTION. You did not mention corn at all. Don't you feed any corn to your chicks?

Mrs. ALLEN. I think I said corn and buckwheat. I use some corn. If I left it out, I left it out unintentionally. I do feed some corn.

Mr. COSGROVE. What do you feed your young chicks to start them off with?

Mrs. ALLEN. I feed oatmeal, rolled oatmeal. Not a bit of wheat.

Mr. COSGROVE. What do you feed your young turkeys?

Mrs. ALLEN. With my young turkeys I am afraid my preaching does not accord with my practice. For young turkeys I preach the use of curd made from milk, separated from the whey, not hard but very soft, but in running my farm I cannot depend on that. The calves take the milk from the cows, so I do not have the milk to give to the turkeys and I raise those on oatmeal just as I do the chickens. I really think, however, that curd is a better food. I like the oatmeal because I have never had any bowel trouble with young chicks from the use of it. Of course, I do not feed for the first few hours at all; do not feed anything.

QUESTION. Is the oatmeal fed exclusively?

Mrs. ALLEN. No, that is the first feed. Then as they begin to run about a little I keep a hopper that has some dry mash in

it, such as I give to the hens, and let them help themselves. I put this in a feeder which I have manufactured myself. It is made so that the little chicks can eat undisturbed. As they grow older, I give them a little cracked corn and the dry mash feed, and I find that when I use it in this way they will never overeat.

QUESTION. What do you do for rats?

Mrs. ALLEN. I have but little trouble of that kind.

QUESTION. Do you use cement floors?

Mrs. ALLEN. I have tried three kinds of floors in the henhouse. The first was a dirt floor. There is no better for draining a henhouse than this, yet nevertheless, there is a certain dampness which will come up through the floor. That is not desirable. Then I tried the boards, but the rats came up through the boards and the boards were not so easy to clean. Finally I put in a floor of cement. A good many object to cement floors for henhouses, but really my experience is that if the floor is put in in a correct way and kept covered with litter, I believe there is no floor so good for the henhouse as one of that kind. By putting it in in the correct way, having it well drained underneath, it makes a floor which the rats cannot burrow through and makes a very warm floor for the henhouse. We probably have about a foot of stone under the cement floor, because in putting in the floor we had to dig quite deeply and we filled in with stone. Of course, three or four inches would make a good drainage. But with a good foundation of stone, and then putting in three or four inches of good Portland cement, made up one to seven of good sharp gravel and sand, makes a very good floor. We were putting it in the cow stable. We put down a layer of tarred paper and then painted that with common, ordinary coal tar, and then put on another layer of tarred paper. We put three layers under the cows in the barn, and then the cement on top of that. I should imagine about an inch and perhaps three-quarters of cement on top of that tarred paper. By using that you will cut off the possibility of any bit of dampness coming up from below, and you have an excellent floor which is warm. The heat will not be carried through the floor into the ground, and by covering it with litter and keeping it so that it is thoroughly covered with litter we have an ideal floor for a henhouse, to my mind. You do not have to replace it. It is there as long as you live. It

may cost a little more perhaps than the board floor in the first place, but I doubt it, and it never has to be repaired. It stays there for life.

QUESTION. Have you your chickens all in one house?

Mrs. ALLEN. I believe not. This year my husband is back home, and I am going to try another plan. I think I shall start in with brooder houses which will keep about 200 in a house. It is not a good plan, I think, to have them all together.

QUESTION. Mrs. Allen, will you kindly give us that formula for your mash again?

Mrs. ALLEN. Two hundred pounds of good wheat bran, 100 pounds of middlings, 100 pounds of linseed oil meal, 100 pounds of gluten meal, 100 pounds of good beef scrap, and corn meal.

QUESTION. Don't you use any salt in your feed?

Mrs. ALLEN. No, because the salt will rattle down through the mash feed. Occasionally I give my fowls a treat which serves that purpose. I cook up some potatoes or something of that kind and salt them. There is one thing which is very essential, and that is green stuff. Fowls needs some succulent food for the best production of winter eggs. It does not matter so much what it is. One year when I did not raise other things we had a lot of small potatoes which I cooked up for the hens, and I found that they answered the purpose just about as well as to use cabbage or something of that kind. Something of that sort should be given to fowls because it aids the digestion of the fowl. There are some things that I am going to try to do this year. Among other things I am going to try alfalfa. I believe there is no better green food for fowls. I believe I have got one of the best stands in the county, and if it winters through I am all right.

QUESTION. Why was it that you lost so many turkeys?

Mrs. ALLEN. Well, I have explained that. It was due to the disease that I spoke of, but I think I have overcome that trouble.

QUESTION. Did their crops bloat at all?

Mrs. ALLEN. No. The symptoms, the more pronounced symptoms are an enlargement of the intestines, and after a time the enlargement of the liver and yellow droppings.

QUESTION. Did castor oil have any effect upon them whatever?

Mrs. ALLEN. Oh, yes, I saved a few, I am sorry to say. I had much better let them died.

QUESTION. Did it make any difference the quantity you gave them?

Mrs. ALLEN. I usually gave them enough. I usually started in with about a tablespoonful.

QUESTION. We found sometimes that their crops would bloat, and then the first thing you know their liver is upset, and there is nothing that will correct it.

Mrs. ALLEN. That is due to a packing in the crop. The disease that I speak of is simply and purely a germ disease. It is not caused by anything but a germ.

QUESTION. I would like to ask how old the chickens were when you began to feed that way?

Mrs. ALLEN. I just put it in their feeder. When the chicks come out they eat it just as soon as they come out. Little chicks, however, will not eat any very large quantities. They will stick to the oatmeal for about a month. Then they will begin to eat cracked corn and wet and dry mash, although I do not believe they grow quite so rapidly as those chicks that are fed on wet mash. They will mature quickly. I had pullets hatched about the 20th of April which were laying the last of October — Barred Plymouth Rocks.

A. MEMBER. I have used some bran at that time and rather like it.

Mrs. ALLEN. Of course, there is a good deal of bran in this mash.

QUESTION. In speaking of hens for laying, would you use salt?

Mrs. ALLEN. I did use salt as long as I fed them the wet mash, but I did not feed it to them in the dry mash. I did not notice any difference, but occasionally, as I said, I give the hens a treat by cooking up some potatoes and giving them that necessary element of their food in some such way.

QUESTION. Would you feed oats to young chicks?

Mrs. ALLEN. No. They can help themselves to them as soon as they begin to want them. I let my chicks and hens do a good deal as they want to.

QUESTION. Wouldn't they do better if you gave it to them?

Mrs. ALLEN. I have not thought so. Of course, I see that they are getting oatmeal, and look out to see that the older fowls do not get it away from them. But I am afraid I am taking up altogether too much time. I do not want to keep the floor all the afternoon.

Just in conclusion, do not forget to give your hens water. Keep them free from certain things, that is, avoid the three Ds, dirt, damp and drafts. Provide for the four Gs, grit, grain, greens and ground bone. On top of that, there should be a little bit of gumption on the part of the feeder. (Laughter.) That is another element which enters into success in the poultry business. If you avoid the three Ds and provide for the four Gs, then I am sure you will have success in the production of good poultry and good quantities of eggs.

The PRESIDENT. I think you are all ready to agree with me that it takes a woman to understand poultry and to run the poultry business. I think Mrs. Allen will agree with me that there are some men that know something about poultry and we have a few of them in Connecticut, I am proud to say, and one of them is the next speaker, Mr. W. H. Card, who is to favor us with a "chalk talk." I am going to ask that gentleman to take the platform without any further introduction.

FIRST DAY — EVENING SESSION.

Music.

Convention called to order at 8.15 p. m., Mr. George A. Cosgrove of Willington in the chair.

The PRESIDENT. I am the President of the State Poultry Association, and I am also a member of the State Board of Agriculture. Therefore, Mr. Lee, the President, has asked me if I would oblige him by taking charge of the meeting tonight. As I am of an obliging nature, I have consented to do so.

If you will kindly take seats up this way it will make it easier for the speaker. It is awfully hard for a speaker to speak over a whole lot of empty benches. If the State Board of Agriculture has anything to do, or is in any way the cause of this bountiful rain tonight, it is one of the best things the State Board of Agriculture ever did, for the State of Connecticut is awfully dry and needs rain sadly. Whether we are the cause of it or not, we are going to accept the honor of causing it all we can. (Laughter.)

Tonight we are to listen to a lecture by Professor Rettger of Yale College, who has been investigating for quite a long period of time the cause of one of the most fatal diseases that affect our young chicks. If that cause can be prevented it will result in a great saving to the poultry interests of the United States and will be a grand thing. I know that experiments have been conducted at Storrs under Professor Stoneburn, and they have sacrificed hundreds of young chicks in carrying out these experiments, and they have made good progress, but, I understand, if they have not already found the way to cure or prevent the terrible disease, they are on the road to that end. I have not listened to the lecture which is to be delivered tonight, and I do not know how far the speaker can go in saying what has been done to find a remedy, but I know that you will enjoy it, and I am sure it will be very instructive to the poultry keepers of the State.

We will now have the pleasure of listening to Dr. Rettger of Yale College.

FURTHER INVESTIGATION OF WHITE DIARRHEA IN CHICKS.

BY DR. L. P. RETTGER, Sheffield Scientific School, New Haven.

Ladies and Gentlemen: I feel that half of my lecture has already been accomplished through what Mr. Cosgrove has said. I am particularly interested in three lines of agriculture from a scientific standpoint, and have been for a long time. One is the subject of soil fertility — namely, how can we restore to the soil the richness which the annual crops take from it. You remember in Victor Hugo's work "*Les Miserables*," he says, "We are pouring the richness of the land into the sea," and he wonders what will happen in the future when all the richness is poured into the sea. The subject of soil bacteria has been particularly interesting to me, because it answers the question of Hugo. Then the subject of dairying is one of prime importance and of interest to me. A large amount of scientific work has been done in connection with the dairy industry. I have been particularly interested in that phrase of it having to do with the public health, the study of scientific dairying, the study of the cow, and of methods to preserve the health of the cow, and for the production and preservation of pure milk. And then third, the subject of poultry diseases. There is a field that to me seems to be practically unexplored. It is a field which even those who are fairly well acquainted with the subject matter do not quite appreciate yet, I think, what there is to be known, and it seems to me that the field of animal diseases, and particularly poultry diseases, is one in which some good results are going to be obtained in the near future. If you take a few of the more important diseases like cholera, fowl tuberculosis, go over the list, we will find that, in fact, that there are very few of them that we know anything definite about, so far as the cause and cure is concerned. The two that I mentioned have been investigated more or less, and experiments have set us, so to speak, on the right track. But take many of the well-known ailments, such as roup, weak-leg and numerous other diseases, and particularly intestinal troubles of fowls, and we know very little indeed about them, and that applies particularly to bowel troubles of chickens. It has been about ten years since my attention was first directed to this subject of chick diseases. I must admit that during these entire ten years I was not constantly engaged in investigations, but I was anxious to get all sorts of material

bearing upon the problem of what we knew about what we have come to call in the last few years white diarrhea. Ten years ago I did not understand the prominence of the disease. In fact, I thought it might occur here and there in an isolated way, among flocks of chicks that had been injured by cold or by super-heating in the case of incubators or in brooders, but as the years went by I found I was working with something that had a very much wider horizon than I ever dreamed of, and today I feel that the time that we spend on the subject of white diarrhea is well spent. What we have done I shall try to put before you as a bacteriologist mostly, and Professor Stoneburn will give you the practical side of the problem.

Nearly all of you have had occasion to know what the seriousness of this disease is. I believe there is no poultry raiser in Connecticut, or no poultry raiser of any large number of chickens, but what has had his attention called to this scourge. Not only the poultry raiser on a large scale, but the chicken raiser who is raising for broilers and for his own use, the fancier, in fact, all have had something to do with this trouble. Now many investigators say that this disease occurs among incubator-hatched chicks; that we do not know of any cases where hen-hatched chicks have the disease. Therefore, there is something in the method of hatching incubator-hatched chicks that we must seek for in our investigations. Well, it is true to a large extent. I know that a large majority of the cases have occurred in artificially hatched chicks, but at the same time I know there are cases, and I know of a few cases of considerable prominence, where the chicks were not brooder chicks, or incubator-hatched, but were hen-hatched chicks. In fact, the original piece of work that I did on the subject was connected with something like seventeen hen-hatched chicks that were reared under outdoor conditions, the best conditions that I knew how to give them, but I must admit that the chicks were killed during wet weather, and perhaps that has something to do with the disease. I shall show you a little later on that the mere chilling or improper incubation, lack of ventilation, poor brooder facilities and many other causes are alleged for the presence of white diarrhea, but I shall also show you that these things are not the direct cause of the disease. In most every paper on the subject of poultry diseases we find reference to one or another of these alleged causes. Like carbonic acid. That was an alleged cause for some time, and is, to a certain extent, still urged. Over-heating, chilling of the chicks after they were hatched, and before

they were hatched, and so on. In connection with the first epidemic of ten years ago I succeeded, after some difficulty, in obtaining from the blood of a chick an organism that has had my attention ever since. During these nine or ten years I have been at a loss to know what to call this bacteria which I thought at the time, and which I am now sure was the cause of that original epidemic among those seventeen chicks. Now I shall call that organism the bacterium pullorum. It may seem more or less arbitrary, but I have had advice from men who are skilled in this sort of thing, and have decided to call it the bacterium pullorum. I hope you will pardon me if during part of my address I may be just a little technical, going into what we call the bacteriological side of the subject, but you will appreciate, in fact, you must appreciate that if we are going to get anywhere in the work on this subject that part of the subject must be an important one. We must get at the cause of the disease. If we can study that cause in connection with the disease, and isolate from the victims of the disease, the cause, you will appreciate that we may in the end arrive at a remedy. I do not mean to say that we have an absolute remedy as yet.

Now this bacteria was found in the blood of these chicks nine or ten years ago. They were chicks about two weeks old when I first noticed the symptoms. I will refer to just a few of them. First of all I noticed a whitish diarrheal discharge of a more or less mucilaginous character. I at once called the disease a diarrheal disease, but I knew nothing about the bacillary character of white diarrhea at the time. I investigated the subject, in fact corresponded with authorities at Washington and others, and nobody there could inform me as to the disease I was working with, its name or anything else connected with it. That peculiar diarrheal condition was accompanied in every case by an extreme emaciation. The chicks became decidedly poor, weak and they were unable, as a rule, to eat. If they did eat, they mechanically went through the process of pecking at their food, but without much success. The weakness was progressive, and I noticed that they would fall against the wall of the coop they were in. They would lean up against that for support. When they got still weaker they would occasionally utter the peep, peep, peep which we recognized as a sign of distress, and give other signs of that nature. But what appealed to me particularly was the discharge from the intestines, the emaciation, and the extreme weakness. As time went on the same thing occurred, and a year after this first discovery of the epidemic I

met with the disease at other places remote from that where it first occurred, and again among hen-hatched and not among incubator-hatched chicks. There were the same conditions involved in this case as in the others. The disease made itself known within a week or so after hatching. The symptoms were very much the same, and I succeeded, as I did before, in this attempt, but with less trouble, in isolating the organism that I had isolated the previous year from the blood of the liver, and also from the spleen in a few cases. I obtained it from the spleen once or twice. The disease was of such a character that I became satisfied that it was a septicemic blood infection. The next question before us was the prevalence of the disease. To what extent it might be found, the mortality and the question as to whether the symptoms corresponded in the different instances of its outbreak. I made another study, continued my investigations here and elsewhere, and found that the study was in its infancy. A year after that another epidemic occurred, and the organism was again found in the same way. The disease answered the same description, and I felt sure on those three occasions that I had exactly the same thing to deal with. The study of the organism itself, the bacteria, verified my conclusions. An examination of the chicks afflicted with this organism demonstrated that, and I have found it such a large number of times that I can now make a very brief test or examination and easily obtain a definite conclusion. At that time I did the work in the ordinary way, and tried all sorts of things, but did not have a practical working scheme. I would say to anyone who is interested in the investigation of white diarrhea from a bacteriological standpoint that the bacteria can be isolated in the following way. I will emphasize this again a little later. In the first if you open the chicken carefully, lay the chick on its back and open it carefully along the middle line, lay aside the skin flap and dissect down until you lay bare the surface of the liver or spleen, then make a small puncture with the scalpel or with the point of a pair of sharp scissors, and insert the surgical needle such as is usually used, running this into the lobe of the liver, and then withdraw it, you can usually obtain a sufficient amount of blood adhering to the end of the needle to permit the investigation. Then that is thoroughly dried and put into a regular incubator to await developments. In more recent years I have found this test was very satisfactory. Usually by the use of this method we can find in from twenty-four to thirty-six hours that the tube has a number of very fine

specks upon the surface. You can hold it up and see them upon the surface. They are colorless. They are very small. They do not get large, and, in fact, they look and act almost as the erysipelas organism that we know so well now. That is a peculiar thing. There are usually very few of them. What you usually get are opaque. If there are any bacteria there at all you will have the indication whether you are on the right track or not. If you have no bacteria present that surface will remain unspotted. If you have something else present, some other organism aside from the organism of this chick disease, you will find a different sort of growth. The trouble in the past has been, I believe, that such examinations were made and the tubes were not scrutinized carefully enough, or else that the medium was such that the colonies were still smaller than those I have developed. I know in twenty-four hours some of these colonies, unless you hold a powerful lens over them, cannot be discovered. You actually have to do that, especially when you are examining the ovaries of the chickens or hens, or the organs of the fowl. Then, if you have encouraging results, the thing, of course, is to verify what you have done, or continue the diagnosis. We pour the medium into a tube which has been thoroughly sterilized, and pour into that a liquefied jelly with which we mix a little of this material, stir it or mix it thoroughly, and allow it to stand. Then after an incubation of from twenty-four to thirty-six hours we examine the plate and look for the same thing that we got on the surface of the tube. There again we found these very minute spots. Now not only do the colonies remain small like the condition which I have previously described, but there is something peculiar which the hand lens will not bring out. We have to place the culture under the power of a good microscope and examine the colonies one by one. It is not necessary for me to go into this branch of the subject at too great a length. The colonies remain small, but, as a rule, the whole plate is clear enough with them to use a hand lens to see them. Then we have used different tests, but there is no need of my going into that here. After all of this microscopic work to isolate the organism itself and to prove it as the same thing, the question then remained, what can you do with the organism when you have isolated it from a chick? What can you do with it in the way of producing the disease in question? That is a thing in which I have been interested from the first. Could I actually reproduce the disease by taking a pure organism and injecting it through a hypodermic needle

under the skin? Could I do that so as to produce the disease just as I had seen the disease originally? Investigations to settle those questions were commenced. The results were at first failures because my chicks were too old. Then by the injection method, injecting under the skin directly was not satisfactory because most of the time I failed to either kill the chick or reproduce the disease, but after trying once or twice with young chicks the results were better. I found I could reproduce the disease at will, reproduce a disease typical in every respect. About four years ago I took up the work again in earnest because then I realized what it meant to the Connecticut farmer, and I realized how general what was called white diarrhea really was, and how important it was to Connecticut poultrymen that the disease should be conquered if possible. Investigation had shown how general it was, not only in Connecticut but all over New England, in Canada and in a big part of the west. The same disclosures were made in connection with these Connecticut epidemics which I had followed up. Annually I would be informed of two or three or four big epidemics, and in most cases, was able to investigate them. This went along until last spring when, through the assistance of my friends at Storrs, we were able to obtain chicks directly from the College for experimental purposes. In those chicks we found the same conditions as I have described them. I obtained the same organism, without any question whatever, from the ovaries and other internal organs, particularly liver, spleen, lungs and heart of the birds. I felt certain then that we were working with one organism, the organism that we had been working with all along, which when injected under the skin of young chickens would reproduce the disease in almost the same condition that we observed it in a natural epidemic. But here at once came an objection. The practical man would say, "Well, a chick don't naturally have bacteria injected under the skin. That would not be a natural method of infection." There is where the work rested until we took it up at Storrs last spring on a larger scale and in a decidedly practical way. The facilities at Storrs I found to be perfect for investigation. No expense was spared to provide us with brooders and eggs by the dozen, and with hens and chickens for experimental purposes. In fact, everything that we needed to do the work well. I was indeed happy for the opportunity. We undertook the investigation. In fact, we tried to verify everything from the first, but our main attention during this year has been directed to solving the question

of the possibility of infection through the food supply, and not through the skin. There is a question which we said would be uppermost in everybody's mind. Is this infection produced by infected food or does the chick acquire the infection by picking up the droppings of other infected birds, or is there any other way of infection such as infection brought about long before the chick is hatched from the egg?

Now I will go back to the question of infection from the food supply. We started with one lot of chicks, several lots rather, of chicks hatched at the same time. They were divided into several pens. We experimented with these for some time, but the results were negative. Of course, we thought that we must have done the work improperly, but upon looking over our data thoroughly we came to the conclusion that we had not given a fair chance for the bacteria to work because we had taken chicks that were too old when we began to infect them with the food supply. If we took chicks one or two days old and not three days old we might have succeeded. We naturally tried the thing over, this time paying attention to the age. We took them out of the incubator, before they were scarcely dry and infected them by putting a water suspension of this organism down the throat of the chick with a little medicine dropper, and then after that fed them two or three times daily with food that was infected with the organism. We succeeded in reproducing the disease, particularly in one of the three lots, probably in a second lot, but we were not so sure of that. But in the one lot we felt confident that the organism that we had fed the chicks was the organism which was reproducing this white diarrhea. Then we took three lots of chicks and infected them with the organism at three different times, at three different dates over two years apart, A, B and D. A was two years old. B was almost two years. D was this summer's isolation. The D lot was the successful lot that responded to the treatment, or to the infection. Now why? We know that in fowl cholera, or in typhoid fever in man, if the disease bacillus, or whatever it is, is isolated and kept away from that body that it has made the victim for any length of time it loses its original power to produce the disease. The cause then of those few variations in the results was not then far to find. D was a comparatively fresh organism. A and B were not able to do the work. In the next experiments we tried in this way: in one case we used germs that were isolated from chicks that came from Storrs, D-2, D-3 and D-4. They were isolated at different times — D-2 from fresh eggs, D-3 from

hen-hatched chicks and D-4 from one of the ova of an infected hen. In that order also we had the age taken into consideration. D was the oldest, D-2 was younger, D-3 was still younger and D-4 younger still. When we came to the results we found that D-4 killed over sixty per cent., D-3 several and D-2 a few, if any. In the infected lot the mortality was far below what it ordinarily is when you are trying to raise chicks, but we felt encouraged in our effort to reproduce the disease by the infection method. We are still going on with the work, and intend to devote the next summer to making ourselves proof against any criticism of our methods. Proof of results by duplication of the work is necessary in any kind of work of this sort. We feel, however, satisfied upon one thing, that the disease may be transmitted from chick to chick during the first few days, and is readily carried from one to another during the first twenty-four hours after the chick leaves the egg. It does not take but a moment to appreciate that. Newly hatched chicks are running about pecking at everything. The droppings of infected chicks are picked up just as any food material would be, and these young chicks are infecting themselves long before they are having any food within their stomachs, and that is the fact, that seem to be one of the great dangers in the transmission of the disease.

Now I will hurry with the rest. The question as to the source of white diarrhea naturally comes to the fore. At one time there was a large lot of eggs incubated of which a large number failed to hatch. I requested that they send me such eggs, and they sent me fifteen dozen at one time. I was overwhelmed with work, but I succeeded in examining a few of these. Out of those eggs I found eight of them infected with the bacterium pullorum. The infection was in the yolk. Out of the seven and one-half dozen eggs, we, therefore, found a certain number that were known to contain the bacterium pullorum in large numbers. That was encouraging, because we saw that we were getting back nearer to the source of the thing. We examined the shells and failed to find any indication whatever of the organism being on the shell. We thought they might be deposited on the shell, but the result of the investigation was altogether negative. Those eight eggs where we found the organism in the yolk were unhatched yolks, yolks that were not fully developed, not of full size. The organism was found in eight of those yolks, or recovered from the yolk of eight of those eggs that had failed to hatch, or that were taken out of the incubator because they were known to be defective or dead. We soon

after that had several fresh eggs. There was not but a few dozen, if I remember rightly, and I succeeded in finding the same conditions again that I have just spoken of in connection with the incubator dead yolks, namely, we found infection of the yolk of fresh eggs, not of the yolk I should say, but infection within the ventilation membrane, and the organism was again found in considerable number. We seemed to be still getting further back to the hen. Those had come from Rhode Island Red hens that the owner had prepared for market. He asked me to come up there, saying that we would work over those Red hens and see what we could evolve. We had not gone very far with the examination of the hens before we found right after they were killed that out of twenty-three hens twenty-one had decidedly abnormal ovaries. These were old Rhode Island hens. I think two or three years old. And we found eight infected decidedly abnormal ovaries. These were old Rhode Island hens, that had laid these fresh eggs contained this bacteria. Now twenty-one of the twenty-three hens that we examined had decidedly pathological ovaries. Some of the ovaries were almost black, some a greenish black, some orange colored, some light, and some as hard as hard cheese, of all grades of constituency, and the shape of the ovaries was varied too. Sometimes they were almost like a square block of wood. They were perfectly abnormal pathologically. Then we made an examination from them, as I have described in connection with the chicks, and found that out of twenty hens that we examined there were nine had ovas infected with the bacterium pullorum. That is, we found in those ovas of nine hens the bacterium pullorum. Now I will stake my life on it that we were not misled. Thus you can see that brings it back pretty near to the source. The question then arose where does the hen get the organism? Just as a child carries the tuberculosis germ somewhere in its system in a sort of dormant state, so does the hen carry the germ of this disease, and in that way carries the seed of mortality which may be transmitted to her chicks. How does the hen get the organism, and whether through feeding or through the water supply, or through picking up infected material in the poultry yard, or how else may the hen get the organism? These are questions which it seems to me must be worked out if possible.

Now to sum up briefly, I would say that this organism that we call the bacterium pullorum is found in chicks which have all the symptoms of white diarrhea, and as we have known the disease. I know we have some who do not agree with us. But

I shall not discuss that question. I would say this, however, that the infection may be brought about through the food, if the food is infected, or the yolks within the first two days after hatching; that the infection probably, in many cases at least, is brought about in the incubator where there is no segregation of the chicks, and where the chicks are allowed to run with forty or fifty others in one incubator. One chick having the disease among a lot of fifty can be the beginning of the scourge, and the cause for an epidemic, just as one case of typhoid may cause an epidemic among the human species.

Then the infection is found in the hen itself, and therefore particular attention must be paid to breeding stock, to get a healthy condition among the hens, and in that way eradicate or avoid the disease as much as possible. I believe there is the secret of the prevention, and as we have worked along, that has been borne in upon me more and more. I have no doubt that many so-called poor laying hens have pathological ovaries, but in many cases the presence of this organism makes them pathologic along with other conditions, of course; that the hens are responsible for the infection of the eggs; that the eggs are infected, and then the infection is carried down, the infection within the yolk remains there until the chick develops and the chick itself absorbs the infection. If that be possible, and that is only an assumption, I can see that the yolk is directly responsible for the infection. Now during the incubation period the organism is absorbed with the yolk itself by the chick, because we know the organism is in the chick, and it is in the blood of the chick, and we know that it is the very organism which produces symptoms of the white diarrhea.

I need not give you any method of prevention beyond what I have already hinted at, but I think the suggestion of possibly better care along certain lines will be uppermost in your minds, so as to prevent using infected hens for one thing, infected eggs for another, and the infection of the incubator for another, so as to prevent the infection from the yolk to the chick during the incubation period.

I thank you.

The PRESIDENT. I think the farmer who lives in this age is to be congratulated upon the fact that educated men are willing to spend their time for years in patient investigation of these cases of disease which we never used to know anything about at all, which are so difficult to find out about, and which occasion

such great losses. It is a matter of great congratulation. The farmer ought to be thankful, and he ought to honor these men who are willing to spend their time to see if they cannot find some way to get rid of some of these causes of loss. Now a few men have not realized the immense value of the agricultural interests of the country. They do not think of the values produced, and they do not think how dependent a great many people are upon the farmer's success. How long would a city like this live if the farmer was entirely wiped out? How long would the city live? It could not live for a week. We are entirely dependent upon them. Our business prosperity is dependent upon them. Take this one thing of our corn crop during the last year of 1909. According to the agricultural department, our crop of corn is valued at one billion seven hundred and twenty-four million. It was raised out of the earth in about one hundred and twenty days. That crop added fourteen million dollars a day to the wealth of this country. Fourteen millions for every day. Just think of the values that are being produced. How dependent we are upon that. I should like to have time to dwell upon it, but cannot dwell upon such matters now. It seems to me we should be gratified by the fact that men are willing to devote their time to finding out the cause and prevention of so many of these things which occasion us farmers great loss.

Now we would like to have this splendid address by Professor Rettger supplemented by what Professor Stoneburn has to say upon the same subject.

Professor STONEBURN. Mr. Chairman and Gentlemen: Dr. Rettger has stated that in this investigation we have possibly trespassed upon the territory of someone else; that other people are taking up the investigation of this subject and that we have walked on their toes. Now Dr. Rettger is too modest. That is not true. Dr. Rettger is the Christopher Columbus of this white diarrhea investigation. He was the first man to land. There are people who do not care what Dr. Rettger may find as long as they get the credit. Are we to understand that Dr. Rettger is wrong, or that the people whom I have mentioned are wrong? Not necessarily. I think it is entirely possible that there are diseases or troubles that are closely allied to the disease which we have been talking about, and many uniform symptoms that possibly

might be termed white diarrhea that are caused by different organisms. Now I do not want to be quoted as saying that that is true. I simply admit the possibility and I believe Dr. Rettger does. I feel, however, that Dr. Rettger's claim to the discovery of the germ of this disease that is known among the poultrymen of New England anyway as the white diarrhea is fully established.

I want to ask how many poultry-keepers here have had this disease in their flocks, or who have had young chicks diseased with a disease that they considered white diarrhea. Please stick up your hand and let me know. Well, I see there are some victims.

Now I am going to read a list of the symptoms of this disease as we have observed it, and I want you to tell me frankly whether or not these symptoms accord with the symptoms that you have observed in your own flocks. In the cases of the disease where we have been able to reproduce it, we have always observed these symptoms. I mean they come with a fair degree of uniformity. Now I am going to read these symptoms and I want you to break in at any time and say, "That is the way it goes with me, or, "That is not the way it goes," because what we need is your co-operation at this time. We want to know that we are really working with the disease that you know as the white diarrhea. Death may occur within a very short time after hatching without any prominent symptoms except weakness and lack of vitality. You go to your brooder in a day or two after the chicks are hatched, and you will find one or two little fellows dead. The characteristic whitish discharge from the vent soon makes its appearance in the flock, the time depending without doubt upon the virulence of the organism and the mode of infection. The discharge may be slight or profuse; in color white or creamy, sometimes mixed with brown. The voided matter is more or less sticky or of glairy character. It may simply streak down below the vent or may cling to the down in sufficient quantity to seal up the vent. This is the condition that poultrymen designate as "pasting up behind." The chicks soon become listless and sleepy, inclined to huddle together and remain under the hover much of the time. They do not seem inclined to get out into the sunlight, but are inclined to get back under the hover. They seem to lose appetite and do not eat much. Frequently when they attempt

to take food their action is more or less mechanical. They seem to want something to eat, but apparently cannot bring it about. They will peck at a morsel of food three or four times before they pick it up. The wings begin to droop or project slightly from the body, with the feathers rather ruffled. In acute cases the eyes are closed and the chicks become indifferent to everything that goes on about them. Many of the chicks peep or chirp constantly, the sound being shrill or weak according to the strength of the individual. You hear them going peep, peep, peep, around the brooder. They make that sound probably because they are in pain. Frequently when endeavoring to void the excreta the chick utters a shrill twitter, apparently a sound of pain. The breathing may be labored, the abdomen heaving with each breath. During the progress of the disease the chicks may die suddenly while still fairly strong, but in most cases they begin to grow weaker and weaker until they are scarcely able to support their own weight. In this state they are frequently to be seen to rest against objects for support, standing with legs braced apart, squatting or lying utterly helpless. Undoubtedly, some of you have had this trouble in your flocks, have picked up a chick in that condition and found that there was still some life in it. Frequently the chicks take on the appearance which poultrymen call "short backed." The back seems to shorten and the abdomen to protrude out of proportion, causing the chick to look stilty as compared with one of normal development.

Are those the symptoms of the disease as you know it? Anyone any objection to that? Does anybody disagree with that or does anybody object to that description of the symptoms? We want to know whether the poultrymen of Connecticut regard this as the disease that we are working on.

A MEMBER. A great many times, Mr. President, I have noticed they have all of these symptoms that the Professor has read.

PROFESSOR STONEBURN. Occasionally you will find individuals that do not show the same character of excreta, but some of it is more or less mixed with brown. Frequently the droppings do not accumulate at all upon the fluff. It is a satisfaction to me to see that those symptoms meet the understanding of those present of what the white diarrhea is, and that that is the type of the

disease that Dr. Rettger and others are working upon, and what he has called the bacillary white diarrhea as distinguishing it from other possible forms of the disease.

Now how many of you think it is worth while after a chick has died to cut it open and try to find out what happened to it? (A few hands raised.) I think there should be more. I think if you would take a little more interest in that you would learn quite a little. Now the post-mortem appearance of chicks that die of this disease are about as follows: the crop empty or partially filled with slimy fluid or with food. The kind of slimy fluid differs slightly and frequently the crop when full you will find some of that sticky fluid substance in it. Sometimes it will pour from the mouth, and there may be some from the lungs. The lungs are usually found normal. The liver is usually found pale with streaks or patches of red. These apparently slightly congested areas are usually large in size. The kidneys and spleen apparently normal. The intestines pale and for the great part empty. A small amount of dark grayish or brownish matter frequently present. Ceca usually filled with a grayish soft material. Only occasionally do we find the ceca filled with a cheesy or firm material. Dr. Morse states that that is always true of white diarrhea.

Unabsorbed yolk is usually present, varying in size from a pea to a full sized yolk. The color may vary from yellow to brownish green, or nearly black. In consistency there is also much variation. It may appear perfectly normal, distinctly gelatinous or watery. Frequently it is observed in the character of custard, and again more or less dry and firm. Unless the chick has been dead for some time, the yolk is usually not found putrid, but merely stale. The word stale expresses the smell. The chick as a whole appears more or less anaemic and emaciated. The muscles of the wings, breast and legs may be almost completely wasted away. Those are the appearances.

Now what does our work amount to? I wish to say that the work has been conscientious. We have done our best. We have not been trying to make any record, but I wish to say that the results that we give you are actually what we secured in our work. Every man who has been connected with it has been conscientious, I believe. During the latter part of the experi-

ments Mr. Stephenson, who addressed you this morning, has had charge of the chicks. Right at this time I want to express publicly my appreciation of the hearty interest and enthusiasm which we received from the Experiment Station. When the matter was first brought to Professor Clinton's attention it was understood that it might be somewhat expensive, and that we might possibly need a great many chicks; that we would require certain equipment. We had to have more or less material constantly, because if these results are to mean anything they must be secured from a fair number of chicks, and not from a half dozen. As we intended to kill as many of these chicks as we could they knew they would not be available for the market, yet Dr. Clinton heartily and enthusiastically backed the proposition, and helped it in every way in his power. If it has been possible for Dr. Rettger to do anything since the making of these arrangements, I think they are due in large part to Professor Clinton.

Now Dr. Rettger has told you that we have found the organism first in chicks that died from a disease that we consider white diarrhea. Secondly, he has found it in the embryo, in the egg. Third, he has found it in the yolk of fresh eggs and finally in the ovary of the hen. Now it seems to me that that is a pretty complete list, and that we can follow it right straight back to the fowl itself.

QUESTION. Did you examine the roosters?

Professor STONEBURN. Yes, with a negative result. In other words, friends, if you have got bacillary white diarrhea you can make up your minds that the disease is not due, as Dr. Rettger has said, to poor incubation, poor birds or poor feeding, but it is due to the infection of this specific organism. The organism may make greater headway in chicks which have been weakened by any one of these things. I mean if you so carry on your operations with your poultry that you produce chicks that are weak they are more likely to contract the disease, and further, to die from the disease, than are strong chicks, even though the strong chicks are infected. On every infected farm a certain percentage of your chicks are hatched with the disease, and from that you can expect a continuous performance of trouble. It will be bad right along.

Wherever we have injected the pure organism under the skin we have had one hundred per cent. of mortality. Every chick has died. Where we fed the organism to chicks over three days of age we have been unable to produce the disease, but I think in every case where we have fed the organism — I do not mean in every individual case, I am talking about flocks of an average of fifty — I think in every case where the chicks have been under forty-eight hours of age we have produced the disease in certainly a large number of cases. I said a moment ago that these results would mean nothing if they had been secured from experiments with merely a few chicks. We wanted to have a wholesale experimentation in order that we might say that the experiments were reliable, and not merely laboratory tests upon two or three chicks. We took 198, we took 396 chicks all of the same age, and hatched from eggs secured from the same farm, hatched at the same time and in the same incubator. They were divided into equal lots and placed in exactly the same sort of brooders. Up to five weeks of age from the 198 chicks in the non-infected, or, as we say, controlled, lot, the chicks that we gave our usual care, the loss was twenty-seven chicks, and that was in the month of August. In other words, about thirteen per cent. of loss in five weeks. You do about that right along. In the infected lot in the same time we lost seventy-nine chicks. Twenty-seven in the controlled lot and seventy-nine in the infected lot. Now that does not tell the whole story by any means. The chicks that managed to survive in the infected lot were distinctly inferior to those in the controlled lot. They weighed fifteen per cent. less, were not feathered as well and gave the appearance of being mighty poor stock. These chicks were cared for in outdoor brooders of our own design and which were real outdoor brooder houses and not little temporary brooder houses.

Now I am going to take three lots, in order to make this as strict as possible, and I am going to take the results from the two that gave the largest mortality. We had two chick lots. We put forty-two chicks in each pen in the brooder house. I want to say again that these chicks came from one farm, were of one variety, were hatched in the same incubator and at the same time, and were divided equally from one incubator into different pens. If we could make them any more uniform I would like to

know how. We tried to make the chicks exactly alike. Now, as I say, we divided them into two pens. In pen No. 2 we fed the organism as we secured it from fresh eggs. In pen No. 3 we fed the organism as we secured it from the ovary of the hens. In pen No. 5 and pen No. 6 we simply gave our chicks good care. The result in five weeks was that we lost in our two chick lots nine chicks; from our infected lot of eighty-four chicks we lost fifty-one. Nine as against fifty-one. Isn't that proof enough that we have an organism that is causing some trouble? I have had lots of people come there and have invariably asked them to pick out the healthy pen and the infected pen, and I do not care who it was, every individual could pick out the infected chicks because there was such a marked difference between them and the others.

Now what more are we going to do? We are going to try our best to find a method of prevention and method to cure. I think Dr. Rettger has more confidence in our ability to prevent the disease than in our ability to cure it, if once it sets in. There are several points that the Doctor brought out as means of prevention that I want to elaborate. In the first place, the original source of infection is the hen. And the only thing to do is to get rid of the hen that is giving you infected eggs. One of the best ways to do is to mark your chicks from different hens. I do not think it is any very difficult thing to mark chicks from different hens. If you find that pen No. 1 is giving you good strong chicks and pen No. 2 is giving you chicks that have the disease, I would eliminate that pen No. 2. But suppose your birds are extremely valuable, and you see that in pen No. 2 there is a possibility of the disease only coming from one or two hens. It becomes a question then what to do. If the birds are worth while you can install divisions of the pen and find out which hen is giving you the infected chicks.

Next be careful about the chicks in the incubator at the time of hatching. You all have to watch your incubator more or less, and you know as soon as the chicks come out of the eggs and begin to run around a little they peck at each other and at the droppings about the incubator, and this one infected chick, as the Doctor says, may cause the whole brood to contract the disease. It seems to me that it might be wise then for us to use in our

incubator the so-called trays, or something that will break the newly hatched chicks up into small groups rather than to allow them to run together as an entire lot. Now that means probably that you have got to keep your chicks away from each other until they are about two days of age, but most of us keep our chicks in that long anyway, so that is not a difficult matter.

The PRESIDENT. Now are there any questions?

QUESTION. If you were raising chicks and had perhaps fifty per cent. of your chickens in that condition, would you kill them in order to stamp out the disease?

Professor STONEBURN. Well, perhaps that is the logical thing to do, but I am afraid a good many would not want to do that. The trouble lies that most of us have not got our nerve with us when it comes to handling the chick.

QUESTION. The natural thing, of course, is for a man to save as many as he can, but I should say if you were to cure one of them it is likely to be diseased all its life.

Professor STONEBURN. That is a thing we are going to know this spring.

Now Dr. Rettger is particularly anxious to receive reports of outbreaks of the white diarrhea, so-called. If you are so unfortunate next spring as to find your chicks diseased with a disease which you consider to be this white diarrhea, I wish you would let Dr. Rettger, whom you can address care of the Sheffield Scientific School, New Haven, or myself at Storrs, know about it. It is possible that we may be able to visit you, but if not, we may be able to get some information from you, and possibly give you some information as our work develops.

Now, Mr. Chairman, there are one or two little matters in connection with the work of the poultry department at the college that I want to speak of.

First, in regard to this matter of our poultry courses. It has been customary since '92 to give a short poultry course during the winter. Our regular short course begins January 4th and runs six weeks to February 11th. It is a course devoted entirely to poultry raising and horticulture. At my request, Professor Gulley has kindly consented to give us considerable work in horticulture and, in my opinion, in the future we are going to see the combination worked out more than it has been. We are

going to get two crops from one piece of land if we can. The work this winter with poultry and horticulture, so far as our equipment will let us, will be made as practical as possible. The work will be devoted to giving practical instruction, and those who take the course, just as far as possible, will be taught poultry keeping by doing rather than saying, but I regret to say that our equipment is not sufficient to do all that we would like, but we are going to do the best that we know how. The entire cost of that course need not exceed \$40.

There are three lots of people who, in our experience, we find like to take this course in poultry raising — school teachers, business people and professional people; and in order to accommodate those we are offering a summer course which will open after the close of the regular term and continue so as to give us four school weeks. That course was given last year at Storrs and was very successful. It was attended by a large number. That course will be repeated this year and I want to say to such of you that have not been at Storrs in the summer that it is a most delightful place and, if you can arrange it, it makes a very pleasant place to spend a part of one's vacation in a very practical way.

I would like to say further, Mr. President, that there is a bulletin on the press setting forth the discoveries of Dr. Rettger, and such of you as are on the Station mailing list will receive copies directly. If you are not receiving it usually, drop a card and I will see that a copy reaches you forthwith. I am sorry that the bulletin has not been printed in time for general distribution here. Only a very few copies have been printed.

THE PRESIDENT. I am sure we have all been very much interested in these very instructive addresses which have been given to us by Dr. Rettger and Professor Stoneburn. We are to have another, however, by Dr. C. F. Hodge of Clark University, on "Game Birds under Domestication." It was a lecture which interested me a great deal when I heard it last July at our field day at Storrs College. The lecture contains a great deal of interesting and useful information for the farmer with reference to the importance of preserving game birds and our native birds, so as to destroy our insect pests. I presume Professor Hodge will tell us how many bugs one of those little birds that he is

going to talk about will devour in the course of a day, and you can see how beneficial to agriculture the cultivation of birds is.

Dr. C. F. HODGE. Mr. Chairman, Ladies and Gentlemen: I believe my excuse for being here arises from the fact that in a government bulletin entitled, "The Bobwhite or Quail," for which I am in part responsible, the statement is made that probably no form of poultry culture would be so profitable as the rearing of the bobwhite. That statement I have sustained, and I wish to illustrate it somewhat by the examinations that I have been trying to make. But in seeking to understand the question from my point of view I will ask you to take a brief excursion into another but related field and seek the motive underlying the purposes of us biologists. I am going from here down to the American Ornithological Society meeting to discuss some of the forms found on this continent. The purpose of that society in part is the preservation and protection of our bird life, and we want to have everybody take part in that work. We must, in fact, have everybody take part if this form of life, which is so essential to the agriculture of this country, is not going to be exterminated and make a desert of the American continent. You get the idea. The effort in the past to domesticate animals and birds has meant a great deal and will mean a great deal more for the race and for us as Americans in our highly organized life, and that is the kind of work that we are trying to carry on all over the country. If we ask the question whether it is worth while or not, all we have to remember is that it is estimated that these little birds alone such as you see here (indicating) devour twenty-one thousand bushels of insects every day. If each one of these devoured only fifteen insects per day that will take six hundred insects a day, and I can tell you about some more of them, but it is estimated that these birds alone consume eighty-six thousand bushels a day. The ravages from insects on our agricultural crops is something tremendous. We need a great many more birds than we have because we know that from very low estimates the loss from insects imposed upon the farmer and upon the consumer of agricultural products amounts to nearly one billion of dollars a year, or almost one-seventh of the total value of our agricultural crops destroyed by insects. Nothing makes a pet which the children are interested in more than birds. I like

to have the little folks doing something with living things, and it is a splendid thing to give them a garden, to let them watch things growing in the garden, to give them something to take care of and love. I wish that every little boy and girl in the country was taking good care of some chickens. It gives them something to take up their attention, gives them outdoor exercise, and when they get up and have little folks of their own there will not be such an amount of infant mortality as we have now. We bring up our children and they do not have anything to take care of and all at once they do not know what to with themselves. We need to bring these things into their lives more.

Now with reference to our game birds, we have very foolishly exterminated, particularly here in New England, or practically exterminated some of the finest game species that we had. Many of them are gone from our New England hills never to return. I want to see game laws arranged for in the different states and a good strong movement initiated for more game and for the preservation of game. That movement is already under way. It is now being advocated and pushed and in many cases is meeting with strong public approval. We need more game and particularly more game birds. That is what we must have or we shall continue to have the barren wilderness that we have now. As a matter of fact, now, a great many farmers do not want any game on their land because they fear it will be over-run. In that way, the game has been depleted, but we need to right-about-face and to have laws which will protect the farmer absolutely and give him a proper return for the game that he raises. We can have a country full of game with the proper kind of legislation and without many of the evils which the farmers have complained of. Take our wild geese and swans and our wild ducks. The last remaining strongholds of these birds up in Canada are now being opened to settlement and unless we can attract them and cause them to breed nearer the habitations of men the species will become extinct. We must bring them back and have them breed about our brooks and streams, or they will disappear from the continent. Their last strongholds are now being attacked. Here is a mallard duck. We are beginning to attract them quite often. They now are nesting about New England. The wood duck also needs very careful protection.

This slide shows the prairie chicken. The prairie chicken, as most of you know, has been rapidly depleted. They are being exterminated and have been very largely so in the last few years. I am glad to say, however, that they are now being carefully protected in most of the western states where they thrive. I used to hear them boom on the prairies in Wisconsin. I would raise them now here if I could. To me that boom makes the finest natural music that I know. I came within one of getting a fine stock of prairie chickens to begin experiments with from Illinois, and the person from whom I was to obtain them sent them, but they died. Next year I think we will be pretty sure to start them.

Here is another thing. This shows our native passenger pigeon or the wild pigeon of the woods. It is a disgrace the way that race of birds has been exterminated. Most of our ornithologists claim that this bird is entirely extinct. Most of them say there is not a wild specimen of the old-fashioned blue pigeon alive on the American continent today. I am going down to the Ornithological Union and I expect to present before that body something with reference to the problem of reviving the passenger pigeon in America. I think the fault is largely with us who take an interest in game birds. These birds were ruthlessly slaughtered and we ought to have given the warning when people were driving the hogs to feed on the pigeons and birds that were killed at their roosting places. I am not quite so sure as some others I know that the bird is entirely extinct. We used to hear occasionally of a few being seen here and there. I rather feel that there may be some yet. There is just one pair in the Cincinnati Zoo, one pair of old birds remaining that have been in captivity for a good while and that are now sterile. So unless we can find some little flock breeding somewhere the species is gone. I would like to ask if any of you here have seen within the last summer any of these birds, so that you can be sure of them? I saw a flock a year ago last September, and I have reports that are fairly reliable of some being seen only this present October. If any of you discover any of these birds, I hope that they will be given absolute protection.

One of our finest game birds is the ruffed grouse or partridge. It has differing names in different localities. Perhaps I will call it the partridge. Further south they call it the ruffed grouse.

But it is one of the finest game birds that we have in the woods. I have been trying to domesticate them and rear them. I have been at it for seven years and this slide shows some of them that I reared. They are fed very largely on wild fruit in the season.

This slide represents a mistake that I made. I found that we could rear these birds very nicely up to five or six years of age, and then they got some kind of a germ disease and died. We had succeeded in raising some, but we took them away, and then they went on until they arrived at about that age, when they died. I do not know whether it is anything in the nature of the white diarrhea infection or not, but a good many of them had symptoms of the pasted behind, short back, drooping wings, etc. We have a number of diseases in connection with these birds to deal with and it is rather more difficult to rear wild birds than tame poultry on that account. I trust that we shall have some help eventually from men like Dr. Rettger and Professor Stoneburn in clearing away the matter of disease or infection from these birds while being domesticated. That is the only thing that prevents the rearing of these birds in any quantity. We have been going on the theory that we have got the infection from hens. I have given up definitely trying to raise partridge or quail with the hen only when we can have eggs that are uninfected. It is the same with the blackhead in turkeys. We are trying to breed chickens by raising them in new incubators, using eggs from carefully selected stock, so as to raise birds to be the mothers of generations of these wild birds.

Some of the antics of these birds are very interesting and amusing. This picture shows the little hen trying to strut herself. She does it pretty well, just as a young turkey hen in the fall. These birds particularly are very useful about the place in the way of destroying bugs, June bugs, squash bugs, cucumber beetles, cabbage worms, Hessian flies, injurious bugs and insects of that kind. Quail in particular will devour them in large quantities. In fact, they can be of service to agriculture to a very great extent. They do very little harm. A partridge does do some harm, but the quail does not. Let me tell you a story in connection with that first pair that I was telling you about. I was busy otherwise and paid very little attention to them, but the little quail did not lay, and I said to my little daughter, who had made a pet of the quail, "Perhaps if you were to feed that

little bird more insects it would lay. I will tell you what I will do. If you will feed it all the rose slugs that she can eat I will give you a dollar." So she went at it. She had never been to school a day in her life, but she developed her own method. I thought she would catch the rose bugs and then pour them down in front of the quail, but no, she had her own method. She began by simply counting into a tumbler and when she got enough she went and fed them to the quail. Well, the result was 1,286 rose slugs eaten by one little hen quail. That gives you an idea of the possibility of these birds as insect destroyers. I am positive, just as positive as that I am alive, that we could have enough of these bird about the farms if we were to take a little pains to domesticate and care for them, to make our bill for insect damage look like thirty cents. I am sure of it. It is a matter of insects. If we had the sense to rear them for what they could do in saving insect damage, and clearing up our roadsides and weedy corners, we could undoubtedly save to the people of the United States every year, by just utilizing that one bird, an enormous amount of money. A couple of years ago at one of the meetings of the American Ornithological Society, Dr. Palmer told me this story. "While I was out in Illinois I heard this story. A farmer told it to me. Some men came along and shot a quail. The farmer said, 'Well, boys, I don't like to have you shoot the birds on my place; I would a good deal rather you would go into the barnyard and shoot one of my cows. I have lived on the farm and I have seen her devour so many bugs that I know that she was one of the best servants I had.'" This same little quail that I was talking to you about a few minutes ago, in this same flock, ate 868 mosquitoes in two hours. We have made tests and discovered that a large number of Hessian flies were also consumed.

This slide shows the cock hatching eggs. He is a very useful bird. The cock in this case was sitting on the nest hatching the eggs and the hen went over to the other side of the enclosure and started another nest. My quail averaged sixty-five eggs apiece that year. The hens are very industrious layers, and if they can induce the cock to do the breeding and help bring up the young, why isn't it a good arrangement?

The PRESIDENT. That concludes our program for today, and the meeting will stand adjourned.

SECOND DAY.

Morning Session.

Music.

Convention called to order at 10:10 A. M., Vice-President Lee in the chair.

The PRESIDENT. It is a very important question, to my mind, that we have before us this morning. Perhaps I can appreciate it more than many of you can. I spent a few weeks on the other side of the water this summer, and all through Scotland and England it was not only with great interest but with great pleasure that I noted the large number of sheep that the farmers had over there. The gentleman who is to be the first speaker today is to speak on "The Re-establishment of Sheep Husbandry in Connecticut."

QUESTION. Do they have any dogs over there?

The PRESIDENT. I suppose all you are thinking about is dogs in connection with the sheep industry. In England and Scotland they seem to have solved that question, or, at least, largely so. The farmer, unless it may be in the highlands or in the backwoods, has his sheep running near the buildings. The result of that is that the dogs are acquainted with the sheep and the sheep are acquainted with the dogs. And I believe these men that are trying to re-establish the sheep industry in New England, perhaps ought to try to encourage the dog, or rather to educate the dogs by putting the sheep into fairly good lots near the houses. Let the sheep get acquainted with the dogs, and let the dogs get acquainted with the sheep. I do not believe dogs will chase sheep if they know what they are. All of you that have young stock, young heifers or steers that you are fattening, put them out in a wild pasture where most of you want to keep sheep. What do you get at the end of the season? Why, you find that those young heifers will run like deer. They have gone wild. You let a dog get in among them, and they will run and he will chase them. It is the same way with sheep. You want to overcome that condition. Instead of putting them off on a wild pasture where they won't see hardly a person from one month's end to another, and few dogs, they are ready to run at anything that comes inside of the enclosure where they are. Let us tame them by keeping them in lots near at home.

Now this morning I am pleased to say that we have with us Professor R. L. Gribben, Professor of Animal Husbandry in the Massachusetts Agricultural College. He will talk to you on "The Re-establishment of the Sheep Industry." I take great pleasure, gentlemen, in presenting Professor Gribben.

THE RE-ESTABLISHMENT OF THE SHEEP INDUSTRY IN CONNECTICUT.

BY PROF. R. L. GRIBBEN.

Before taking up the condition of Connecticut at the present time, and discussing her internal conditions with regard to the advisability of re-introducing the sheep industry within her borders, it may prove of interest to learn something of her past as a sheep state.

In the United States, prior to the year 1800, there were large numbers of sheep scattered through the country. They had been brought in when the first settlers from England decided to take up permanent abode here. Most of them, however, were an indiscriminate lot, there being as many types as there were localities. This was due to two reasons; one, that very little had been done in any country before that time to improve stock and develop any uniform types toward certain ideals; the other, that up to that time little had been inaugurated in the way of improved methods of agriculture. After the country had become fairly well established after the pattern laid out by the Continental Assemblies, the next step was the development of the now much abused "infant industries." England had for the most part clothed the colonists with her own woollen manufactures, and even for a long time after Washington took his first oath of office, it was customary among the most stylish of the gentry of this new country to adorn themselves with English-made clothes. Many of the more alert minds of that day, however, saw in this new country wonderful opportunities for a domestic woollen trade. Some of these men, who had traveled, at the instance of the Government, in Europe, had studied the proposition of growing wool in their new land, and had become convinced that Spain was not the only country that was adapted to sheep growing, and had further become possessed of the idea that fine wool could be shorn from the backs of sheep which did not participate in annual transigrations to and from the mountains of Spain.

The first man to put his idea into action was Robert R. Livingston, the man who administered to George Washington the first oath of office ever taken by a regularly elected President of the United States. Livingston had fulfilled several missions abroad and, while Minister to France, in 1802, sent to his estate in New York two pairs of Merino, fine-wooled sheep, the first authenticated importation of that breed to this country. This was the first step in the introduction of pure bred sheep into America.

Livingston may have had the honor of importing the first Merino sheep into America, but the same year, 1802, Col. David Humphreys of Derby, Connecticut, brought over a foundation herd of that breed, the progeny of which developed into the American Merino strain, and later, from this start, came the so-called Vermont Merino, which made that state so famous as a fine wool section in the earlier half of the century just past. In those days the woolen industry was not on so firm a basis as it rested on later, and many methods of popular advertising were adopted to assist in establishing the industry more firmly. James Madison when inaugurated as President of this country in 1809, wore a domestic made outfit. The coat was manufactured from wool shorn from the flock of David Humphreys.

The originator of one of the most useful and widely known strains of the early Merino was another resident of Connecticut, Stephen Atwood of Woodbury. He founded the Atwood strain of Merinos, afterward made so famous by Edwin Hammond of Middlebury, Vermont. A fault of a great many of the early fine wool sheep was lack of a rugged constitution, which was made a principal object in Atwood's improvements. This flock had its beginning in 1806 or 1807, and Mr. Atwood paid for one of his first bucks by the wages of a whole year's work. Jacob N. Blakeslee of Watertown had a large and fine herd, as also did John A. Taintor of Hartford. To these men, with Livingston of New York and a later Consul to Spain, Wm. Jarvis of Wethersfield, Vermont, belong the credit of establishing the fine wool Merino sheep as a permanent part of American agriculture.

Of course, with Merinos as the prevailing type, the success of sheep-herding was closely dependent upon wool prices. As in the case of every "boomed" industry, people were for a time carried away with it. Some carried too many sheep for their conditions, and when wool was a poor market proposition, the sheep man was a poor credit proposition. Then there came a

time when the conditions of this country demanded a change from exclusive wool to mutton and wool combined. Connecticut, with a great many other states, seemed disinclined to embark in a new line, and sheep have gradually become less numerous here. Add to this the fact that the reaction following the civil strife of 1860-5, dealt a most deadly blow to wool growing; also the down hill aid that a great deal of tariff tinkering gave, and we find eastern farmers content to allow the great west an opportunity to handle that kind of husbandry.

To place more vividly before us the position Connecticut has taken in the sheep industry, a study of the following read figures issued by the U. S. Department of Agriculture might be profitable.

SHEEP AND WOOL OF CONNECTICUT, 1840-1908.

Year.	Per cent of Decrease.	No. Sheep.	Wool.	Av. wt. Fleece.
1840		403,462	889,870	2.25
1850	56.9	174,181	497,454	2.85
1860	31.2	119,807	335,985	2.81
1870	30.0	83,884	254,129	3.03
1880	29.1	59,431	230,133	3.87
1890	21.4	46,759	218,831	4.68
1900	33.3	31,204	171,622	5.50
1908	†8.9	*34,000	*175,000	*5.14

As the next step in this study of the re-establishment of the sheep industry in Connecticut, there is an answer to be found to two questions, namely, Is Connecticut at all adapted to sheep production? and — If so, is there opportunity for the re-introduction of the industry?

The conditions to which sheep are native are found in rather high and rough countries. They will do well on sparse pasturage and do not require the large amount of artificial protection necessary for other classes of live stock. Rich pastures, low lying, are not essential to their best success. In fact, the low pastures are positively dangerous for sheep. There are in Connecticut, as in all New England, many rough hill pastures, where cattle do not do well, pasturing horses is out of the question, so that all such land lies waste except for the wood cut from it. Sheep could be profitably introduced there. There are other pastures in the State eminently fitted for grazing sheep. This

*Estimates. †Increase.

question is perhaps the easiest one of any to settle. There is no doubt of Connecticut's being adapted to sheep raising, except possibly in a few of the lowest lying parts of the State.

It is the second question that causes most doubters to hesitate. Is there sufficient opportunity for raising more sheep than Connecticut now does? The conditions, agricultural and market, are not so very much different from any in the lower two-thirds of New England. Southern New Hampshire and Vermont, all of Massachusetts and Rhode Island present about the same conditions for study in relation to sheep growing as Connecticut. Therefore an answer to this question for Massachusetts or Rhode Island would be the same as for Connecticut.

In the first place let it be understood that not every nook and corner of Connecticut should raise sheep. There are places where men are doing as well as ought to be expected with what they have already. Neither will it be wise to make a complete and immediate change to the sheep industry in many places where, later, sheep may be kept on a large scale and perhaps made a leading industry. However, plenty of places present an immediate opportunity for the introduction of sheep on varying scales.

It might be well at this point to dwell a little upon a prevailing idea that the west is the only place for growing sheep profitably. A great many who would like to breed sheep here have such an impression. However, people once had the same idea of Delaware as a peach growing country. In localities which now yield peaches abundantly and with great profit, men once supposed that they would have to move to Delaware to grow that fruit successfully. The same impression has become more or less prevalent among fruit growers in general in New England regarding Oregon apples, for example, but there has been as good fruit grown here as in Oregon. Why should we allow the Pacific coast to ship its fruit away across the country to feed New England? The same logic, if such reasoning may be so dignified, would hold upon this sheep question. Are we here going to lie down in our tracks and help keep the great transportation companies in business, the western farmer in automobiles and ourselves in rags, because we will not grasp our opportunities? New England can grow as juicy mutton as Michigan or Wyoming, and can get every cent as much for it, right at her very door. Moreover, there are some people doing it today. New York farmers are taking up the industry again, and New York has no advantage over New

England, especially in regard to markets. Western ranges are being divided, grains there are going up in price, the whole country is becoming more a balanced state; not one-half with high-priced land and grains and the other with both cheap lands and cheap grain. This is giving the east a chance to grow her own grains profitably and has given a chance also for home meat production, which we should take up.

There are dairymen who have not been able to make their cows come up to a profitable yield who could well afford to inquire somewhat into the sheep industry for their farms. There are also dairymen making only moderate profits who could increase the total yield of their farms by adding sheep to the equipment. Sheep are great animals for cleaning up odds and ends around a farm and turning them into wool and mutton. To illustrate: In the middle west there are some six hundred varieties of weeds and grasses. Many of these weeds are serious pests to the farmers there, growing in corners and waste parts of the land, even growing in some of the best permanent pastures, increasing so that the pasture grasses are gradually smothered out. There are only twenty-four of these weeds that sheep will not eat, while cattle leave about five hundred sixty. Nor do sheep need to be starved into eating most of these weeds.

As a home meat supply, sheep are ideal at a season when no other large animal can replace them. Meats are high now, and there are no immediate prospects for any decrease in prices. The farmer in the small town doesn't get a very satisfactory grade of meat, whatever price he pays, because of the presence of locally killed stuff. Here is a chance for sheep that is not often considered. Home-killed mutton is as free from such parasites as trichina, which makes home-killed pork more or less of a gamble, as poultry. It is also a much cleaner product than pork and has a finer flavor by far than beef. Killed at home when at just the right stage of fatness, one has as high grade a product as the packing houses charge fancy prices for, at somewhere near living cost. There is abundant opportunity on nearly every general farm in the State for sheep to be kept for this purpose alone. There was a day when New England meat market was noticeably lower when the winter killing season came around, but we don't hear so much of that nowadays. It still seems practical, and sheep will furnish summer meat as well as winter. They have a strong advantage over any other of the farm animals except poultry, because the carcass can be used up before it spoils, while pork or beef would be entirely

out of the question for home meat in the summer. One of the strongest indications of the opportunity for sheep raising is shown by a study of any one of the leading markets of New England alone. The number of sheep annually coming to these places for slaughter, not counting the carcasses shipped in from the great packing houses, show that the New England farmer, when he buys mutton, is paying someone else a profit really his own. More sheep are being used by far in these large cities than the total number owned in the states in which the cities are located. For example, Boston in 1908 received 380,528 head of sheep for slaughter, while in the state of Massachusetts for that year a total of only 45,000 head was reported. That alone shows the abundant opportunity for domestic sheep production. There must be added to this, however, the fact that nowhere in the country are as high prices paid for these sheep products as in New England and Atlantic seaboard cities. No class of farmers has the markets we do right here, almost in our very front yards. With the shipping facilities every man has, the great market places and the fact that the demand is always good, there seems to be some little chance at least for the man who is going into the sheep business.

Wool has been left entirely out of the discussion so far, but should not be totally ignored by the sheep man. The ewe that shears eight pounds of clothing wool per year at the present prices (which show no signs of weakening to any extent in the very near future), furnishes quite a sum on the right side of the ledger, besides presenting the breeder with her lambs each year. The above is more than the average clip of fleeces per year, but it must be remembered that the average includes all the poor sheep as well as the best. It is safe to say that there are a great many more of poor sheep in the State than the good ones which a man should have in his flock. An average clip of eight pounds yearly per ewe can easily be obtained from good specimens of most breeds, and no sheepman should be satisfied with the poor animals. That is a thing of bygone days in good farming. The present-day farmer tries to get the best and should stick to that ideal. If we want to give the sheep industry in Connecticut another "black eye," we need only to begin with poor stock.

Before taking up the problems of a sheep farm, there are a number of factors that should receive consideration. Some are advantages, some grave disadvantages. Only by weighing these carefully against each other, by comparing them with the

actual conditions of the individual, is one able to decide intelligently as to the wisdom of adding this new industry to old activities.

The first problem which confronts the sheep promoter is that of the dog menace. No definite figures have been obtained upon this subject, but it is a general fact that large numbers of sheep are lost yearly by the worrying of sheep-killing dogs. Some years ago, a man, in the course of an investigation on the subject of "Sheep and the Tariff," obtained a few estimates of the percentages of sheep killed in the various states by dogs. In the table of statistics that he presented Connecticut's losses were far in excess of those of any other near-by state. The proportion that dogs destroyed was nearly six out of every hundred head in the State. Such a loss is considerably larger than the figures would convey to the mind. Figures may express some things as nothing else can, but even the statistician does not realize that loss at all as clearly as does the man who buries the sheep. To be compelled to add to the usual loss from disease, accident, etc., six per cent. from dogs, with the fright and worry that are bound to follow, seems too great and unjust a burden for the breeder to stand.

It was the custom at one time to lay all the blame at the doors of the cur dog and to give the finely bred dog credit of a more "God-fearing" intelligence. Unquestionably the cur dog does his share of the work, but he is not entirely alone. More than once men have discovered some of the best bred dogs of various breeds aiding their plebeian brothers in the destruction of flocks. It isn't the *scrub* dog that causes this trouble, simply because he is a scrub; it is the stray dog, whether mongrel, cur, lap dog (although the latter may be eliminated from the suspects of sheep killing, because they would most probably be frightened to death to get out in the same pasture with sheep), or fancy bred. A southern gentleman, in speaking of the number of cur dogs that endangered the prosperity of the flocks there, said that "the dogs we have are the result of our character." The darky wants his coon dog, for life wouldn't be worth the living to a southern darky who couldn't hunt coons or possums. As a rule these dogs are as primitive as their masters, and, from the average darky's inability to supply sufficient food for his own needs, are compelled to search afield for their own nourishment. This southern gentlemen paid his laborers a dollar each for every dog they killed trespassing on his domain, and soon had the problem of protecting his herd solved in a manner most satis-

factory. Owners of dogs who didn't wish to lose their property, taught them to stay at home, or at least to obtain their mutton in other places. It may be that such a procedure is not always fair, that sometimes dogs which would not touch sheep might be destroyed, but, in my opinion, a dog is as much a man's property as his horse, and should be kept at home as faithfully. If we must have our pets, they should be restrained in a way that would not endanger the property of other residents — our co-operators in making a state. We must get over the idea of continuing forever to live under the absolute freedom and license of savagery. Many a man's activities are handicapped in a civilized community because his own selfish enjoyment — that which under savage conditions would have been perfectly proper — now interferes with the rights of a considerable portion of the community who have as certainly the right to residence there as the offender himself. Laws of communities endeavor to provide justice for *all their members*. It is not just on account of a few dog owners (or even if these owners of dogs are in majority), it is not just to withhold restraining laws, if these dogs are in any way interfering with the activities of another group of citizens. If dogs are to be kept, by permission of a group of citizens who constitute a state, then the state must be prepared to provide for adjustment of damages done, either within the state or outside. The rights of sheep men have been recognized in a large number of our states, but it seems that *sufficient* recognition should be given to *protect* this as all other industries of the state. If the sheep industry of a state so well adapted to it as Connecticut, is suffering through lack of sufficient protection, it is up to that state to do its utmost to build up the industry. This kind of protection is not that kind which fosters so-called "infant industries." There are already in Connecticut the proper conditions of land, feed, markets, etc., for this industry. The conditions are such that Connecticut sheep can be put in the New York, Albany and Boston markets, at the same prices as sheep from other states, and at a profit. No economic or political "protection," therefore, is necessary. One condition seems to hold the industry back, therefore remedy that, and there is "protection" of a just sort, one which shows no favoritism.

The foregoing applies to those localities where the sheep are really constantly in danger from ravage of dogs. Connecticut has a law which provides for the payment of suitable damages for losses through dog depredations. Other states have laws

somewhat similar. But the great trouble with all such laws is *that they do not prevent*. The true loss is never obtained even when damages are assessed. It has often seemed that trespass laws might be taken to cover this. A man is not allowed to kill a dog unless the animal is a proven sheep-killer, and must content himself in merely driving stray dogs from his place. Some provision should be made which would result in keeping dogs at home. A man should have a right to kill dogs he catches on his property, provided they are not attended by a man in reasonable charge, and he surely might be allowed to kill a strange dog which runs sheep, whether any sheep are killed or not. Dogs should be kept at home, or under charge, and laws which compel this are only just.

In regard to damages, the following Vermont provision is one of the best. Its only drawback is the necessity for legal action on the part of the complainant. When farmers' associations or sheep associations are made an actual fact, and money set apart for co-operative prosecution of such cases, then farmers and sheep men will not hesitate so much to enter complaint in such cases.

" PROCEEDINGS AGAINST OWNERS FOR DAMAGES DONE BY DOGS.

"Sec. 5649. *By sheep owner.* If sheep are worried, wounded or killed by a dog, the owner or keeper of such dog, whether it is accustomed to worry, wound or kill sheep or not, *shall pay to the owner of such sheep double the damages sustained*, to be recovered by an action of trespass founded on this statute, with double costs; and if the injury complained of is occasioned by two or more dogs acting jointly, belonging to different owners or keepers, the person injured may have a joint action against the different owners or keepers of such dogs, and recover joint damages and costs against all."

A further provision requiring the death of such dogs is also in force.

FITCHBURG — SENTIMENTAL PREVENTION OF DOG LAWS.

When dog owners are given distinctly to understand that their charges must be restrained from roaming about, and that when caught on farms where stock are kept, symptoms extremely fatal to canines are likely to develop immediately, there will be fewer sheep killed. This latter is up to the farmer himself.

The following is a measure that was passed by the General

Court of Massachusetts on May 14, 1648, and which might prove of interest here: "That forasmuch as the keeping of sheep tends to the good and benefit of any country, if they were carefully preserved, henceforth it shall be lawful for any man to keepe sheepe in any common, accounting five sheepe to one great beaste, and if any dogge shall kill any sheep, the owner shall either hange his dog forthwith, or pay double damages for the sheepe; if ye dogge hath been seen to course or bite any sheepe before, not being sett on, and his owner had notice thereof, then he shall both hange his dogge and pay for the sheepe."

There are other pests than dogs to be considered, although dogs are, in the minds of most people who think of the matter, much the most serious ones to be encountered. The many little internal and external parasites which infest sheep, causing such diseases as liver rot, scab, gids, etc., should receive consideration and due attention in the management of the flock. They are problems a prospective shepherd must always prepare for. One of the reasons that sheep do not thrive so well on low ground, especially if at all moist, is because on such soil the chances for infection from stomach worms, liver rot, etc., are greatest. According to a leading western shepherd, annual losses from the various internal and external parasites to which sheep are liable are far in excess of losses caused by sheep-killing dogs. Sheep are close grazers, and for this reason are more likely to be infected by the parasites that other stock in grazing would miss entirely. This refers more especially to the stomach worm and liver rot. The best precautions to use in such a case as this are preventatives, such as keeping sheep on upland and well drained pastures, rotation of pastures and care in protecting water supply from infection. If a running stream in a sheep pasture flows from a near-by farm where sheep are dying or are infected in the least degree, it is very dangerous and the sheep might well be fenced away from it.

The gad fly, which deposits the grub in the nostrils of the sheep, can be partially fought by placing a little dry lime in the grain feed. This will cause the animal to sneeze, when the young larva may be dislodged. Another preventative is to bore two-inch holes in a large timber with an augur, placing the salt supply in the bottom of these holes and smearing the edges with tar. The sheep will rub off a little of the tar on their noses and the odor seems to keep the flies away.

Ticks, sheep scab and the like should be treated by dipping. Any of the coal tar dips may be used, and dipping twice a year

will usually keep such parasites down. Where a flock has been infected for a long time, the fences, hurdles and all places where the sheep have been rubbing, should be sprayed with some disinfectant.

Objections have been made against sheep because of their supposed ruining of pastures for other stock. They are also said to run down land. No man who has ever taken good care of his flock and prevented the appearance of parasites need fear this ruining of pastures for other stock. Of course, if a place is over stocked, the sheep will keep every blade of grass down pretty close, and other animals haven't much of a chance under such conditions. Where sheep have pastured in moderation, other stock will do well after sheep or with them. As to sheep ruining land, running it down, the Italians say, "A sheep is the best dung cart." Sheep manure is nearly three times as valuable, pound for pound, as ordinary barnyard manure. This fact should be considered when the statement that sheep run land down is made.

Sheep and other stock do not pasture well together in every case. It is not, however, because the sheep make things uncomfortable for the horse or cattle, but the reverse. I have seen cattle and sheep kept successfully in the same pasture. The great drawback to pasturing sheep year after year on the same land is the danger from infection with the stomach worm. For this reason pastures should be changed three or four times a season.

The lack of suitable fences causes many to hesitate on the introduction of sheep. The customary low stone wall of most New England farms offers but a slight obstacle to a really inquisitive sheep, and no resistance at all to marauding dogs. Woven wire fencing is usually required, and this forms the most expensive item in connection with the introduction of sheep on a farm which has not kept any before. Posts may be set along the stone walls, on the outside, to keep out dogs, and the wire fencing attached above the wall. This may be made high enough to furnish a suitable protection against dogs. Movable hurdles may also find a use in fencing sheep on rape or other green "soiling crops."

There are undoubtedly places in this State where wool growing alone may be made profitable, but my opinion is that if the sheep industry is to be re-established in Connecticut, it must be upon some other basis than this. Wool is a product too highly speculative, while mutton is a far safer proposition, and a reason-

able combination of the two the best. The ideal sheep for this State and for all New England is a mutton type, one that matures early, and dresses most attractively; with this mutton, however, should be combined as heavy wool production as a good mutton sheep can be made to yield. The advisability of re-establishing the sheep industry upon the straight sheep feeding basis, such as is practiced by Ohio and Michigan sheep feeders, is doubtful. There are a few instances of where western sheep have been brought here to fatten, but the largest gains cannot be made with old sheep; it is the youngest animals that make both largest and cheapest gains.

For many people, breeding of pure bred flocks will have a strong appeal. There are farms here that are ideal for such a business, and men who will be glad to take up that line of work. There is bound to be a demand for pure bred sheep in the not-very-distant future, but for the average farmer, pure bred animals have little attraction, valuable as they are in a money-making scheme. One great trouble is that many men have been beguiled into paying false prices for such animals. No sheep man, however, should get far away from good blood. For years men who have been breeding pure bred sheep have been keeping the blood pure for distinct purposes, and rams from a flock bred for a purpose are far better than those taken from a no-purpose flock. Well bred rams in grade flocks, together with intelligent selection of the best ewes, will not be many years in building up a very good flock, from which drifting into the pure bred business will be very easy indeed.

However, since the first cost is greater for pure bred sheep, the average farmer will, in establishing his flock, prefer to begin with grade ewes and a pure bred ram. This will make the rams in greatest demand for a time, but once the whole industry becomes firmly fixed in the agriculture of this State, there will be too few pure bred ewes to supply the demand that is bound to rise for them.

For the man who does not feel convinced that pure bred are best, there are two most useful lines of the sheep industry open; first, the production of ordinary fat spring lambs, and second, the growing of "Christmas" or hothouse lambs. This means that only those individuals needed to keep up the breeding flock should be allowed to grow into mature sheep. The reasons for preferring lamb raising over feeding of yearlings follow: First, more mutton can be grown per hundred pounds of feed on lambs than on older sheep; second, gains on lambs

are the cheaper; third, there is a greater demand for well fattened and good types of lambs; fourth, for the New England farmer growing lambs does not bring him so strongly in competition with the western farmer; and fifth, there is less danger of loss from parasites because the spring lambs are out of the way before summer, the time when danger of infection is greatest, and the hothouse lambs are under better care and given closer attention than could be true if a product not so high in quality were being grown.

When you do take up the industry, go into it rightly. If you want old ewes, buy them at old ewe prices, not young ewe prices for old ones. This is one thing which ruined the sheep industry here at an earlier date. It has given the industry severe setbacks in other places in more recent years, where so-called "promoters" have introduced sheep in new localities at prices far in excess of their true value. This was especially true in the Dakotas when they were first being settled in the latter 80's. The craze for fine wool in Connecticut led people to plunge headlong into the business, without any careful survey of the situation. Farmers who had shown themselves intelligent and enterprising in other directions, pulled down their barns to build greater ones, or at least made costly preparations for growing wool, and then sent from one hundred to one thousand miles to purchase Saxony sheep at \$100 to \$500 each. One can easily imagine the feelings of the buyer, who had known little or nothing of sheep, when his prize packages, his golden fleeces, arrived at the farm.

Starting in on a sane basis, with no booming methods, but rather with determination and persistence, the demand for high grade products, the shipping facilities and the conditions which are bringing western farms more to our own conditions, are all furnishing abundant opportunities for the successful re-establishment of the sheep industry in Connecticut. Let us remember that the early bird gobbles the fattest worms, and that states presenting similar conditions to our own are already beginning to act.

The PRESIDENT. Is there any discussion on the paper which we have just heard?

If not, I want to say just a word on the value of sheep as a means of fertilizing the land. Now in England many of the farms over there are under what is known as the leasehold system. Their leases will not allow them to plow up the grass

land. They can mow it, they can plant it, but for some reason or other the leases do not allow the grass land to be plowed up. Of course, that makes it difficult to fertilize grass land, and one of the ways in which they do it is by putting sheep on to it. They put on feeding racks and continuously change the position of these feeding racks where the sheep feed, and in that way they will fertilize that field. It seems a slow process, but they do it to a very great extent.

In my boyhood I lived in the northern part of Massachusetts, and I well remember the reputation of Vermont in those days as a sheep-raising state. I remember the large flocks of sheep they used to drive through my town, and it is with a great deal of pleasure that I present to you a gentleman from that state that has such a reputation as a sheep-growing state. I am pleased to inform you that he has on his farm five hundred Dorsets. I take great pleasure in introducing Mr. P. C. Jones, superintendent of the Benton Farms.

Mr P. C. JONES. Mr. Chairman, Ladies and Gentlemen: What I know about the sheep business I got by hard knocks, by lots of failures and few successes. What I do not know about sheep would fill a big book. I know more about breeding and feeding than I do about speaking to an audience. Those two things are rather far apart, and even if I have made a success of one I may not make a success of the other.

Now I have just got several points.

First, there is no use in us New Englanders undertaking to go into sheep farming under the same chances that they do in the west. We cannot do it. We have not got the land. But the west, or the people on the other side cannot beat us Yankees, not once, in anything. We can make a success of stock farming in New England, and it is being done. In the first place, we have the right sort of stock on the farms to begin with. The right kind of men and the right kind of farms. New then we have advantages over the west in our close communication with the markets. We cannot compete with them perhaps in the quantities of sheep and the quantity of cattle that they raise, but we can raise just as good a quality, and we have got the markets to dispose of it in. What we can do is to raise the stock. There is no place on earth where the conditions, the natural conditions are better for the raising of stock than they

are in New England, and that, in my opinion, is one of the strongest points in favor of stock farming that should be considered by us New Englanders. Now if we go into the stock business, if we go into the production of mutton, or lambs, or beef, and we can go into any of them provided we go in under proper conditions — there is one thing we have got to do in order to make a success of it, and that same thing can be carried on through the dairies. It can be carried on through every line of farming that we undertake in New England, and that is combination or unity. If the farmers of New England would stand together, stand as their fathers did, shoulder to shoulder, we could accomplish a great deal. If we make up our minds that we must have forty cents a pound for butter, that it is going to cost us more money to produce it, and that we must have a larger price, then all we have got to do is to stand shoulder to shoulder and insist on forty cents. If we make up our minds that we have got to have six cents a quart for our milk, and they won't pay it, hold your milk at home. They will not stand it very long. They have got to come to us. The only trouble with us farmers is that we do not hold together. We want to hold together. That is the trouble with the whole business. We do not stand together. We can put our own men in the Senate, and we can go even higher if we want to, provided we stand together. All we have got to do is to hang together, but the trouble has been for years to try to get the farmers to stand together. It has been tried, and we are making slow progress along that line, but after a while it may come. It may not be in my day, but it will come sometime, and instead of us being led we will take the other end of the halter and we will lead a while. Now that, I believe, is the secret of success with stock farming, and the secret of success in New England with dairying as well as some other branches.

Now I want to say a word with reference to the abandoned farms throughout New England. We all know that there are lots of them. Why are they abandoned? Why, a man cannot make a living on them. That is the reason. But their forefathers made a living on them, our ancestors made a living on them. "Oh yes," you say, "but they did not have to have what we have to have today. Conditions were different." Truly. The conditions were different. There has been an evolution in everything. There also has been evolution going on in

farming. We cannot go back and undertake to farm those places as they used to be farmed, but they can be farmed and farmed profitably if we keep abreast of the evolution in farming, the same way that men in other lines of business have. The man who comes and tells you that farming does not pay, that a man cannot make a living on a farm, I will tell you the type of man he is. He is the man who goes out in the barn and does the chores, takes an hour and a half, then takes his milk and drives four miles to the station, and then goes up to the store and tells stories for an hour or so, drives home, gets dinner and takes a nap, and perhaps gets the chores done at night about eight o'clock. When he goes home in the afternoon, he does about two hours or more of chores, and then he says that farming don't pay. Do you suppose that our merchants, if they went and opened up their stores for an hour or so in the morning, and then closed up their places of business and went off through the middle of the day, and opened up again for a couple of hours in the afternoon, that they could make their business pay? No. Nor will farming pay when it is carried on in the same line. What has caused our farms to be abandoned throughout New England is that the cities have robbed us of our best men. They have robbed us of the same timber that made Lincolns. The same timber that made the McKinleys and the Garfields, the Tafts, and all that class of men. That is the kind of timber that was grown on these abandoned farms, and that is the kind of timber that has got to rehabilitate those farms and bring them up again. If a farmer had three sons, and the older boy, after he got through the common school, and got so he could swap jack-knives pretty well, and gave his father the idea that he was pretty smart, why, when that fellow got through school the farm was too slow for him, and he probably got into the country store. He had the push and sticktoitiveness, and the ability to make a success. His opportunities were greater in the city than they would have been in the country. He went on, built up a good business and became rich. The second son takes to books. He does not like work quite so well. The father did not have much of a chance at an education, and he determines that the boy shall have a chance. He makes that boy a minister, a doctor or a lawyer, and he leaves the farm. The third fellow comes along. He don't care anything about books, and it becomes a problem

what to do with him. Well the farmer says, "He ain't good for much else, better make a farmer of him." Now that fellow will not make a farmer. If he is not good for anything else, he is not good for a farmer. The man who had the business ability and the sticktoitiveness, if he had stayed at home on the farm he would have made a success. Now what does it all amount to? Why simply this, that that old man has sent his cream to the city, and has kept his skim milk at home. (Laughter.) Isn't it time that that process was stopped? Isn't it time that some of the cream was kept at home on some of these farms?

Now let us take up and speak of these farms and what their prospects are with sheep. I am a sheep man. I have raised some other stock, but my inclination and love is for sheep. These abandoned farms I have been speaking of, and when I speak of abandoned farms I do not want you all to get the idea that I do not think that some of them ought to have been abandoned. There are a whole lot of farms in New England that ought to be abandoned, some of which are not abandoned, but some of that that are inhabited, and the same sort of land as those which have been thrown up. Now I should advise putting sheep on that land because the land is, in a way, run down and depleted. You cannot expect to take hold of those farms that nothing has been done for and expect to skin them. We have got a lot of it up in Vermont, the only trouble with it being that instead of lying on the surface it is set up on end, and some of the farmers up there have tried to skin one side and then turn it over and skin the other. Some of them have kept that up for years. You cannot expect a farm of that kind to produce much in the way of crops, but in our section of the county and, in fact, 'most all of New England, it is naturally a pasture country. Now then, take that land and stock it with sheep. Do not think because this year at home you have had ten sheep and you have raised fifteen lambs and have sold them, that you can take ten times that many and do as much with them, because you cannot do it. That is a case where the ten had a lot of care, and if you had ten times ten, while perhaps they might have some amount of care, yet you would not get the same result. Take a sufficient number, not a number that will live on so many acres, but a number that so many acres will keep to perfection, a number that an acre will

turn into first-class, marketable stock, and that number of sheep should be carried on 'most any farm. Of course, the number that you can keep depends upon what an acre produces. The first thing to consider in the stocking of any farm, whether it is an abandoned farm or one that is not abandoned, is the question of fences. Now the idea of thinking that you can cut down a few brush or spend a few hours in the spring on a forty-acre lot to get it in fit shape for sheep is a mistake. If sheep do not get out they do not get in. You have got to spend a little money to get your pasture in the right condition. You cannot afford to allow the pasture to grow all to bushes, and expect that a lot of sheep are going to do well in such a lot as that. You better consider starting with fewer sheep and better sheep and better pasture, and on top of all that see to it that you have got some good fences to keep the sheep in and keep the dogs out. Now I do not know what your conditions are exactly down here, but we are not a great ways from you, and I imagine that our conditions are about the same as yours, except that our country is a little rougher. I do not know what it costs us to fence land. I am buying wire at fifty-five cents. I figure that it costs me under the conditions and the prices that I have to pay for wire and posts about \$256 to fence forty acres without the labor, but that is a fence that is a sheep-tight fence, and you can take and put a dog in and I will bet you he will not be able to get out. I went up to one of my mountain pastures this fall deer hunting. We have a number of deer up in that section. There was a dog that got into that pasture; he had got away from the party and he had been in there long enough so that he was so weak that he could not get out. He was so weak that he could not kill sheep, anyway. That fence has the wire stretched to the posts so that it is very close to the ground. If there is a little hollow under the first strand of the wire, we gather a few stones and build up under the fence. That is not only done this year, but next year before my sheep go on the mountain. The pastures are all gone over carefully. If there is a hole under this fence, we put stone in that big enough so that a dog cannot pull them out. We put stone there that are going to keep him back, and I have not had a sheep destroyed on our place in seven years. From the time we put our sheep out in the spring until they are brought in in the fall, they

are never put in a corral. They are never put in a sheep barn. So you see they are right out in the open and if the dogs could get at them at all they could run them. So much for the dog end of it.

Now I do not think that the way we handle sheep is the best way, but perhaps ours is the best for our conditions. There are many methods that are better than ours. Many a man would handle them better, a great deal, than I do, but I try to handle them the best I can under the conditions as they exist in our locality and we do get some results. Now, of course, if a man was as good a trader as that first son that I talked about that went to town, you might make a swap and get into the sheep business, or if he was like a friend of mine, or acquaintance of mine, that I knew in Texas, he would get along first rate; that if you were a good trader you might make a success if you went into the sheep business. But I am not going to spend all my time telling you stories. I am over-stepping my time now.

Now we will take up the feeding of the flock and the handling of the flock through the summer and through the winter. I cannot tell you the best way to do, but I can tell you how we do it. I turn out usually in our section about the 20th of May. The sheep are put right on the mountain, presumably turned out to pasture, but I do not turn them out to pasture exactly, because I go up once in a while on Sunday morning and give them salt. You turn them out in the pasture and go and look after them. You have got to do it if you are going into the sheep business. A man who goes into the sheep business, who thinks that all he has got to do is to turn his sheep out and let them take care of themselves is not going to make a success. When it comes shearing time and when it comes time to sell the lambs, if that flock has been taken care of as it ought to have been, you will hear a better story out of the sheep business. A man does not buy his cattle and milk them the next morning and then let them go until the following morning. He knows that is not the way to take care of dairy cows. If you go into the sheep business, go into it with the same idea — that you are going to take care of the flock. You do not have to go every day, but you do want to keep in touch with that flock so they will see you and so they will have some idea of what you are when you go into the pasture.

Do not adopt the practice of going around to see them once in three or four weeks. They ought to be salted regularly. Go and see them every two or three days, if you can. You want to keep salt before them all the time and with that salt you want to teach them to chew tobacco. It is a mighty bad habit for some men, I know, but it is a mighty good thing to teach your sheep. It is pretty good stuff and it is very cheap stuff to give sheep. I buy tobacco for them all the time and it is cheap stuff. Now that is practically all the care that those sheep get during the summer. I go over and look after them as often as I can, and if one of them is not acting right, or if I notice anything the matter with any of the flock, I remedy it. Sometimes some of them will get hurt by stepping on a sharp stone or something of that kind. I go up there to see that no dogs have got in. I do not expect to find any, but something is likely to happen in a bunch of sheep at any time. I figure that those sheep should be fed at least three times a week by someone, and at least once a week by me. I do not send a man if I am at home.

Now then in the fall we bring them down to the barn. We usually change the pastures in the summer; usually we make it a business so as to bring my sheep in the fall, my breeding ewes, in the very best shape that we can. If I can bring them in in good shape in the fall, I can carry them through the winter at very much less cost.

Now for a winter ration I feed a mixture of oil cake, oats and bran. One hundred pounds of each. I figure that each grown sheep shall get about a pound a day, and I mean by a pound a day sixteen ounces to the pound, not three-quarters of a pound. I figure that they get it, and if I find in my flock a few sheep that are not doing well, I take them out and feed them by themselves and they do well for the extra time. I also use ensilage at the rate of one bushel to ten sheep. I feed roots, both mangels and turnips. I never feed mangels to a ram. The quickest way to have a ram commit suicide is to feed him mangels. Whether it is in the locality or whether it is something about the way we grow them, or whether the variety of mangels, or something of the kind, I do not know what it is, but I tell you they kill them fast, but turnips do not. Mangels will not hurt the ewes. That is about the way we feed them. Of course, we have to feed the

individuals that we have cut out a little different from that, perhaps. We sort them out and treat them as each case requires.

With our lambs, when pushing them for market, we feed a little different, but I had not intended to take up the lamb end of it; at least I will not until later.

Now the showing and the judging of sheep is a point that this sheep breeders' association, as well as all other sheep breeders' associations, should consider. There is nothing that will do more for the sheep industry of New England than the showing of good sheep. There is no greater advertisement for any particular sheep than the good showing of that breed. Now if we are going to hold down our breeders, and allow all the premiums to go to imported sheep which are the product of an experienced English shepherd and breeder, instead of giving them for the encouragement of our own home breeders, we are not going to do a great deal to help our home breeder. If we are going to give our premiums in that way, we should give up the business. Personally, I do not care anything about it, because I would rather show against an imported sheep than not. I believe that the Yankee can raise just as good sheep as any man on earth, and I am a Yankee, thank God.

Now the judging of sheep. It is an awfully hard thing for any agricultural society to decide, or to find the right man to judge your sheep. He may know one certain breed of sheep, he may know one certain type of sheep, but when it comes to putting one man to judge sheep from fine wool, and on to the coarse wools, it is pretty hard to find a man who is competent to fill the place, and you must have competent men if you are going to put the premiums where they belong. It does not make any difference how honest a man is, if he does not understand the breed he cannot put the premiums where they belong.

Then in the selection of sheep and starting the sheep farm, people tell you that half of your flock is the ram. Yes, five-tenths of your flock is your ram, and then just add four more tenths to it, and you will get it about right. When you do that, you will have to give the ram what belongs to him. The ram is a very important part of your flock if you want to make money out of it. I would not recommend any man, if he is going into the sheep business to make money, to go in unless he has capital unlimited

or has time and plenty of it, because a young man starting to go into the sheep business with the intention of breeding thoroughbreds and selling them, even for stud purposes, I would not recommend it, because you see I am in the business. (Laughter.) Yes, we are in the business, and we have been in it for fifteen years, and we have got a reputation established. We are making sales and doing well, and there is room in the business for all of you, but I would not recommend everybody to go into that line. You can get money out of the sheep business quicker by going into another line. If I personally, were starting in the sheep business tomorrow and wanted to invest in the sheep business a limited amount of capital, I should buy native ewes of good quality. I do not care whether they are Shropshire grade or Hampshire grade, or whatever grade they may be as long as they are good, hardy sheep. I should buy those, dividing them between lambs and yearlings — so that they had never been bred. If I was buying ewes that had been bred, I would not hold them over one season. Then I would buy the best horned Dorset that I could buy. I breed them and handle them because I believe in them. I believe in them because they have made good. Now then, if you are satisfied to breed strong lambs which will sell to the butcher for four or four dollars and a half apiece, then what I have got to say will not interest you, but if you want to get out of the business all there is in it in the way of dollars and cents, then you want to raise what I call the hothouse lamb. That is the lamb that is dropped in October or November. Now I am not telling you this without something to back it up. I have no grade ewes now, because our demand for thoroughbreds is such that I have not room for both. I breed almost every breed as a cross with the Dorsets. I do that because there is no sheep on earth that will give milk equal with the Dorset. Now let the man that has got some breed that he thinks well of stand by them just as strongly. I am not saying anything against other breeds, but I do claim that the Dorset ewe is one of the best sheep in the world for milk. The first cross of the Dorset, the ewe will almost invariably increase the milk supply at least one-third over her mother, and oftentimes one-half. Now that is a strong point in the raising of early lambs. I sold out all our grades last spring, a year ago, I think

it was. The 22d of December, I commenced to ship lambs to the New York market. I never ship lambs over twelve weeks old. Most of them were from nine to eleven. I commence to kill when my lambs weigh from 45 to 55 pounds on the foot, and I sell where you can sell and where everybody can sell. I do not sell to any private customer at hotels, but I sold in the open market through commission men, who are willing to do the business for you or anybody else. I just simply put a few of these facts before you so as to show you how I handle the business. As it happened I got my top price for those lambs. It happened to be my birthday. Those lambs sold for thirteen dollars apiece and netted us \$11.98 $\frac{5}{6}$ per lamb. That is after paying the express charges, commissions and everything. Now, gentlemen, that pays better than four dollar or four dollars and a half per lamb. The man who can get ten dollars per lamb at nine weeks old can make some money in the sheep business. Now those lambs cost us very little. That lamb is made almost entirely of milk up to that time. We do everything we can, however, to push that lamb along when we once get it started. We feed some cracked corn and push them for everything that we can, but you cannot get a great deal of grain into a lamb when he is only nine or ten weeks old. Now on February 6th I shipped some at that time which netted us \$9.19 $\frac{1}{6}$. That was one grade, and there was another grade which netted us \$10.44 $\frac{2}{3}$, and on the 20th another shipment which netted us \$10.60 $\frac{1}{2}$. Those prices are net. Those prices were received in the open market through a commission house. You can produce that lamb just as well as I can. There is the kind of lamb you want to raise in Connecticut. It is the kind we want in Vermont or for any other New England state. We are in close touch with New York and Boston, you are in close touch with Hartford; and the best markets, to my mind, the best market for the northern lamb, or for New England lambs, is New York. There is no danger of your flooding the market. The price there is better today than it was seven years ago. Now do not get the idea that a hothouse barn is necessary to raise hothouse lamb. There is no day in the winter when it does not storm that my ewes are not outside. I do not care how cold it is if my lamb is dry. I want them to get out. I want them to eat. I want them to get all the exercise

they can, to get an appetite, and if they get an appetite they will eat and get fat and satisfy my pocketbook. That is the hothouse lamb business. It can be carried on here profitably, and the greatest point of all for the winter lamb is that the winter lambs are not troubled with the stomach worm. My lamb is born, developed and sold at a season when he doesn't get it. The stomach worm, except in rare cases, never does any particular damage to the yearling, but the lamb that is dropped in the spring and is turned out on a pasture that has been pastured last year by old sheep, will certainly become infected. If the pasture or flock itself is infected, and there are very few that are not, then you ought to take some means to overcome them. We do not have any trouble with stomach worms. In the first place, because we try to prevent them by all the means that we know, and in the next place I always figure on putting my lambs that I am going to hold over for stock on a pasture that was not used for sheep last year. I use a pasture for my young cattle or for my dry cattle this year, and next year I give that to the young lambs or lambs that I am going to hold over. In that way we ward it off.

Just one more thing that I want to take up. We often hear people say, and sometimes we say it ourselves, that we cannot afford to raise meat because grain is too high. We cannot raise corn to compete with the West. Have you ever stopped to think that you can do it and that we do do it in New England. Corn in eleven states north of the Potomac River and east of the Ohio River averaged 38 bushels to the acre; for the states of North Carolina, South Carolina and Georgia, fifteen bushels to the acre. And the average for all the others was only twelve and one-half per acre. The average farm value was 30 cents. The Ohio average was 38.5 bushels per acre, Indiana 30.3 bushels per acre, Kansas, 22 bushels, New England, 37 bushels. Ohio beat us one bushel, and yet we hear people in this section say that we cannot raise corn in New England. We do not raise the acreage that they do, but we can get the results.

Now then, speaking about cattle—in the State of Vermont alone we have 288,000 milch cows. We have 214,000 other cattle. In other words, we have 100,000 more than in the State of Idaho, which is a cattle state. In Vermont we have only about 9,000 square miles, most of that stone on edge, which makes our sheep's

legs a little longer on one side than on the other — we cannot compare with lots of the western states in acreage or in area, but there is something in the grass and in the climate here which makes it well adapted for sheep-raising purposes, and it is up to us to find it out and take full advantage of it.

Now, gentlemen, to come back for just a moment to what I started in with. What we want most of all among us farmers and among us New England farmers is to stand together shoulder to shoulder, push and work together, and do anything that is square and honorable to put the New England farmer and stock raiser and his good wife on the pedestal where they belong. I am willing to help. (Applause.)

The PRESIDENT. Are there any questions to be asked of the gentleman who has just addressed us?

QUESTION. What kind of a fence do you use?

Mr. JONES. I use the American wire and the electric weld.

QUESTION. How high do you build the fence to keep the dogs out?

Mr. JONES. It is a fifty-eight-inch fence. What we call ordinarily a five-foot fence.

QUESTION. And you think that will keep the dogs out and them in?

Mr. JONES. Yes, sir.

QUESTION. I would like to ask the gentleman what he means by stray dogs?

Mr. JONES. Those that you cannot keep at home.

The PRESIDENT. The next gentleman whom I have the pleasure of introducing really needs no introduction to any Connecticut audience. His interest in this subject of the sheep industry is something that is known to you all. Mr. Stadtmueller of West Hartford.

Mr. F. H. STADTMULLER. Mr. President, Ladies and Gentlemen: I shall not ask you to bear with me this morning. It is getting late, and I know you are anxious to adjourn. I intended to talk about the dog laws of Connecticut. The question of good dog laws in Connecticut is something that is of interest, not only to the people of Connecticut, but especially to Connecticut sheep breeders 365 days in the year. But owing to the lateness of the

hour I think it will be more pleasant to the audience and serve every purpose if we dismiss my talk from this portion of the program at the present time. Therefore, I shall beg your indulgence to at some other time take up this question for discussion.

Before taking my seat, however, I wish to call your attention to the wool exhibit in the rear of the hall. I am sorry, but the exhibit will have to be removed before the afternoon session.

There are some matters that perhaps it would be well for the Sheep Breeders' Association to decide for themselves, and I was going to announce that after the adjournment of this meeting that there would be an election of officers. I will ask for a meeting of the Connecticut Sheep Breeders' Association immediately following this meeting in the front part of the hall, and then if it is the pleasure of the members to vote to adjourn until after dinner they can take such action at that time.

Meeting adjourned to 1:45 P. M.

SECOND DAY.

Afternoon Session.

Music.

Convention called to order at 2 P. M., Vice-President Lee in the chair.

The PRESIDENT. Farmers, as well as others, are rather sensitive about having their business affairs inquired into. It is known to most of you that the United States government will take a census in 1910, and we have with us Professor Bailey of Yale University, supervisor of the census for the State of Connecticut, and he would like to say a few words to you in regard to the questions that will be asked of you and the way that he would like to have them answered.

Professor BAILEY. Mr. President, Ladies and Gentlemen: The census is nothing new for any of you. The census of the population is the oldest in the United States of any country in the world, it having been first taken in 1790. But we never had any statistics in regard to the towns until 1839, and then they were gleaned for the government by a Connecticut man, Mr. Ellsworth. The Commissioner of Patents, who had charge of the matter at the time, had appropriated for him by Congress

the immense sum of a thousand dollars. He could go ahead and spend it any way he wanted. There was a good deal of curiosity as to how he should distribute about thirty thousand packages of seed that he was to send out. He made an estimate of what the farm products would be in 1840. In 1840 they wanted to put some questions in regard to farms, but nothing very definite was done, and it was not until 1860 that the first questions in regard to a farm census were asked in this country. From that small beginning of one thousand dollars, voted to this Connecticut man, the matter has grown until we now have an appropriation of about thirteen millions, and over ten thousand men continually employed by the Department. In this year of 1910 the work will begin on the fifteenth of April. Formerly it has been the first of June, and the farmers have been too busy on the first of June to stop and give the government agents the information that they wanted. And so it has been decided to have the enumeration on the fifteenth of April. There are two kinds of questions which are to be asked, which may perhaps need some explanation. The first is an inventory: how much is your farm worth with its buildings, its vehicles, its tools, machinery, cattle and live stock of all kinds? Now it is not a bad plan to stop once in ten years and take an inventory of what we have got. Every business man takes one every year, and the government is hoping that this inventory, for which it asks, can be taken of the value of the farm property of the country this year and in the future.

There is to be a second list of questions, such as, What is the income from your farm, and what did you raise on it during the year 1909? Of course, that is going to take some thought. These questions have, most all of them, been printed in the various farm journals of the country, and most of them are pretty generally known among the farmers. It has been the policy of the directors of the taking of the census to give as full information to the farmers as possible, and we want the matter to be fully understood, so there will be no hesitation upon the part of the farmers in answering these questions as fully and as correctly as possible. Therefore, when these enumerators come around to you for information in regard to the value of your farm and farm products, I hope that you will be willing to give them something definite, and not be obliged to tell them that you will talk with them by-and-by, or that you will think it over, or

give them some such answer as that. I hope that you will do your best to have these schedules prepared, and have them as accurate as possible.

As to the men who are to do this work. There is to be one to three enumerators appointed in every town in the State. It is our intention to select good live capable men, men who know something about agriculture, and men who are trusted in the rural districts. I can tell any of you the name of the man who has applied from your city and town, and if satisfactory men have not yet made their application, give me yours. I am going to do the best I can to see that the farm census of 1910 is as good as was ever taken, but it needs the co-operation of men like you to make the success that we hope it will be.

I just wanted to make this brief explanation, and I thank you for the privilege of bringing this matter before you.

Secretary FANTON. Professor, one question: in regard to giving the valuation of our farms, will that be made compulsory? Will that be made public?

Professor BAILEY. I am glad you raised that question. The only person who will know the valuation will be the enumerator, who will be a man who will be sworn to secrecy under a severe penalty. That will appear in no publication, and the individual valuations will not be given out by the government. All of those figures will simply be grouped together.

Secretary FANTON. I thought I would ask that question, as I thought there might be discrepancies in some cases between the valuation given to the enumerator and the valuation that is given to the assessor, which perhaps might lead to some trouble.

Professor BAILEY. The government has tried to head that off by providing that no assessor shall be appointed as an enumerator.

The PRESIDENT. Gentlemen, before we proceed with the next lecture, I want to say that in nearly every chair you will find a slip of paper like this (indicating). This is for you to write down any questions which may occur to you while the speaker is talking. We have a question box, and if you will deposit these questions in the box, or if you will send them to the Chairman, we shall be very glad to discuss any question which you may offer.

Through the instructions of Dr. Jenkins of the Experiment

Station, the men who are doing good work with corn raising, like Mr. Brewer and others, have been able to make an exhibit that would look as though Connecticut was still in it in corn raising. Today we have a New England man to talk to us on that subject. He comes from the Amherst Agricultural College. I am proud to have a Massachusetts man here to talk to you. I now take pleasure in introducing Professor J. A. Ford of Amherst, who will talk to you on corn raising in New England.

Professor FORD. Mr. Chairman, Ladies and Gentlemen: I have been talking corn so much in the last two years in New England, that I am almost ashamed to have my name go on the program, but I believe in corn most thoroughly. I am a good deal like the good man who got home pretty late. His wife found a good deal of fault with him while he was getting to bed, and she said a good many things to him, but he finally went to sleep and his wife was still talking. He waked up, and he said to her, "Mary, is this yet or again?" So I cannot help thinking that perhaps some of you may think is this yet or again. However, it seems to be my mission to talk corn, and it is a pleasure for me to do so. There is a story that illustrates what I mean, and as it seems to apply right here I will take a moment of your time to relate it. A young man was walking with his sweetheart, and just about as he was to leave her at the gate of her parents' home he kissed her. She looked up at him in a half-angry manner, and she said, "What business had you to do such a thing as that?" "Well," he said, "Mary, that was not a matter of business. That was pleasure." (Laughter.) It is a pleasure I believe for me to talk about corn, and I do believe that if we were to pay more attention to corn that we would get more pleasure out of life. There are so many interesting things in the country which if brought to the attention of our young people I believe would induce them to stay in the country and devote some attention to farming. A definition of happiness has been given as capacity to receive sensations. Now all education tends to increase our power of happiness, our power to get happiness, and, as I said before, I believe that the young man who is observing will stay in the country and make a success of it. I certainly believe in corn for New England. More corn. I do not know as it is possible to estimate the amount of corn purchased in the State, but I suppose most of you have some idea

of the amount of corn that is used or purchased from outside of the State in your locality. Now just think of that, and remember that the average price for a ten-year period has been at least sixty cents. Remember it, in this connection, that the average yield per acre is less than forty bushels at sixty cents. Now I say that the amount of money that we are paying out for corn ought to be kept at home. How are we going to do it? It can be raised for less than sixty cents a bushel, but in order to do that you must raise more than forty bushels per acre. We can do it. Remember that there are a good many better yields than the average, and also that there are a good many poorer. Think of what those fellows are doing that are raising less than forty bushels per acre. We must have the advantages of improved methods and improved machinery. I think the time is coming when we ought to plant by improved methods. We have an opportunity here today to begin to plan improvements, and if anything I may say will prompt you to begin to plan those improvements I shall be glad. We must plan ahead in order to get ahead.

Now I know that some say that it does not pay to break up new land for corn. Well, perhaps that is true to some extent. It depends a good deal on the quality of the land. I have known of an instance where a man cleared land for twenty dollars an acre, land covered with stumps. He has done it again and again, cleared this land, and gotten enough from the first crop to pay. There are lots of places in New England that need cleaning out, working up and planting to crops. Corn is a first-rate good crop to put into these places that are cleaned up in the way I suggest. I know it is hard severe work, and I know that the labor problem is a big one for the average New England farmer. The complaint has been general that farmers could not secure the proper kind of help, but it seems to me that we want a few improved methods with respect to that help question. It seems to me that we have got to adopt a new plan. If every farmer in New England or the United States who employs the time of one man would put up a tenement house for him I believe that it would go a long way, gentlemen, toward solving the labor problem on the average New England farm. The man who hires out as farm help, if he has a family, wants to have his family with him, and he does not enjoy being tucked away in any old half-

habitable quarter that you happen to have about the farm. The manufacturer has had to do that, and we have got to do it. It means more capital, but it will pay because it will go a long way toward the solution of the labor problem. Do not make it too cheap a house. But I did not mean, Mr. President, to digress in order to discuss this farm question.

Now just a few words about how we are going to get this forty bushels to the acre. The experiments carried on for a number of years show that they get the highest yield of corn where they have solved the question as to the best distance apart to plant, and that has been found to be three and one-half feet, with three stalks to the hill. Now some further experiments carried on in Illinois, the results of which were published last year, show that in the northern part of the State they gained the most, or the best results, from corn planted three feet each way and with three stalks to the hill. It seems to me if in Illinois and Ohio they can do that, we, with our shorter season, can plant three feet apart each way to good advantage. I do not state that as a definite fact, but just consider what three feet apart means. As I figure it—and I hope you will take a pencil and figure it for yourselves—three feet apart each way would mean 4,840 hills to the acre. Now suppose we drop off ten per cent., and allow one hill in every ten to be missing. Take off ten per cent. and that would still leave 4,356 hills per acre. Suppose we get three stalks on our ninety per cent. That would be 13,060 stalks. Now our friend Mr. Brewer has raised lots of ears that would weigh a pound. Suppose we reckon that you will, and divide that by seventy, which is the weight of a bushel, and you will find that that gives you a yield of 186 bushels, and yet the average is below forty bushels. You say, yes, but we do not raise pound ears. Suppose you raise half-pound ears. There is plenty of Flint corn that weighs more than that, but still you would get ninety-three bushels, if we have a ninety per cent. stand. Now those are pretty big figures, gentlemen, when we compare them with the average, but they only serve to emphasize the fact that if you are going to get the yield you must get the stand. That is the first essential of a good crop of corn—a good stand. I want to take up in a brief way how to get that stand. First, let us take up, before we come to that, the question of improving the corn. How shall we go

about it? We have paid comparatively little attention to plant breeding. We have done considerable animal breeding, and know a good deal about animal pedigrees. Those are all familiar to you, and we are used to thoroughbred live stock. Most of us keep thoroughbred horses and thoroughbred cattle and poultry. But plant breeding is so much easier that it is sometimes surprising to think how little attention has been paid to it. It is easier because, in the first place, the number of individuals can be enormously increased, and also because those individuals will be of little value, but you can cause those individuals to come to maturity in one season. Now there is one very important element about plant breeding, a thing which lies at the bottom of success of plant breeding, and that is plant selection—let me repeat that, plant selection, or the careful selection of the plants from which you get your seed. That selection should, of course, begin with the seed. The plant is the basis of all selection, in the ear or kernel. I have a chart here showing the result of the work done in Ohio by a friend of mine. He believed that the place to select his corn was in the field, because, he said, I want to know what kind of condition my corn grows under. I want my seed to be raised under the same condition of environment as I am going to raise that corn in the next year. As you pick your corn, as you husk it, it should be placed somewhere by itself. This is the method that he pursued. He said to his help, "I want you to go into the field and pick some good seed ears, but you must pick them from hills that have three stalks." The help laughed a good deal, but, of course, they did not understand what he was after. He took those ears and carefully dried them in cold storage. When that corn was cut he again said to his help, "You pick out now some good seed ears," and he planted those the next year in ten-acre plots. All of those were planted three stalks to the hill. The first yielded 76.6 bushels, the second 68.6 and the third 70.8. You see what a large difference there is all the time in favor of the field planted with selected seed, there being an average difference in the three of 3.25 bushels. He was careful to have every condition exactly the same, so that I think we are justified in saying that the field selection of seed is a very desirable thing. You take the best farm men, with a brown sack around the shoulders, and send them right through with

directions to pick from hills having three stalks, and then by taking proper care of the seed gathered in that way you will get seed which will increase your average considerably. We take good care of that. After the seed is gathered, of course, we want to take the best care of it possible, and dry it by heat, keeping moisture away from it so that there is no premature sprouting, which, of course, will spoil it. Plant that the next year.

I have here a sample score-card. I would like to say with reference to the score-card that the object of the score-card is to call your attention to points that need consideration. That is the main purpose of the score-card, and, from my point of view, it has a very educational feature. These are a few of the points you should consider in picking out your seed ears. The first point is to make your selection in the field during the fall of the year preceding the time when you want to plant the seed. Select the seed with the points in mind which I have pointed out to you. Of course, in using this score-card, I use it simply as an illustration, and not because it applies here. There are simply some points that should be varied undoubtedly in Connecticut. I believe it is a good point to form your own score-card to pick out your own ears from. Get an ideal that you think is pretty nearly perfect, and then try to square up to that. But a more important point than that is the fact that you must mature the seed and keep the seed under proper conditions in order to get the highest yield from it. That may not apply so forcibly in Connecticut as in some other states. The main point is, of course, to get good seed, with a high average of vitality, because if the seed is not good our labor is wasted. This has been an unfortunate year for corn, but, as you know, it has been an unusual year, especially in New England, on account of the continued drouth, but we are hoping for a better season next year.

Speaking about uniformity of size, a good deal can be done to bring that about. We are going to have a corn show in New England. We had a good fruit show, and I believe a corn show would be a good thing. When you put your exhibit into that corn show, I hope you will put in a uniform exhibit, every ear of which shall indicate your ideal of what a good ear should be. I understand that you do not have corn shows down here, except

such exhibits as are shown in connection with the meetings of your agricultural societies. I have attended a good many such exhibits and looked them over, and could not tell for the life of me what a man's idea of a good ear of corn was. You know just as well as I do that if you are going to put fruit in the market, a uniform product sells at the best prices; that you sort your apples into different kinds, No. 1, No. 2, etc., and the more uniform they run in size, appearance and quality, the higher the price. At some of the great selling centers, where they have hundreds of cars come in from day to day, where a car comes in from a certain region where the growers have banded together to properly sort their crop, when an inspector gets into a carload like that and looks it over, it at once demands a higher price because it is uniform. It demands a higher price, not only because of the appearance but because it is shipped better than that which is not uniform. The same thing applies to corn. If corn is shipped so that it heats it means that the corn has got to go into an elevator and will lose a good deal of moisture before it can be sold. It decreases in weight and in price. So I think uniformity is important. The growth of corn of a uniform size and appearance is very desirable to encourage, because it tends to fix an ideal for a uniform product.

Now as to the shape of the kernels, the size and the germ. Those points I think I can emphasize by this chart. This chart was made for Dent corn growing, but it brings out the principle, I think, very clearly. Of course, we have here a shape of kernel that more nearly approaches the Flint corn. It is undesirable as a Dent kernel. It is too shallow and contains a good deal of space that ought to be filled with the grain. This in some ways is very undesirable. Then, too, what we call the shoe-peg kernel is undesirable, not only because it has a lot of space which is not filled up, but because the germ itself is small. The germ, of course, is the embryo plant for the next year. The kernels of this type produce small germs and the kernels of this type large germs. Now not only is the large germ desirable, because it starts quickly, but it is more apt to be strong and fuller of vitality. This, then, is the desirable shape for the kernel in Dent corn, and it seems to me we might think of that in studying Flint corn. Then, too, in this character of corn you will see that the

kernel is well carried out to the tip of the ear. The cob is well covered with the grain. We want corn and not ear.

It seems to me also that this brings out the desirability of the wedge-shaped kernel. The color of the grain or the cob is not so important here, but I presume Colonel Walker from Kentucky would say that down there it is desirable to have a corn of uniform color, and that the yellow-colored corn must have a red cob. It all indicates the necessity for a careful attention to uniformity again.

If you have the wedge-shaped kernel, you will have very little space between the rows. In the Flint variety you know there is a tendency for the rows to spread and leave open spaces, and I should think we had better select corn that would not show those characteristics. The length and circumference, I think, should be considered together. If you have a small cob, you will get a high per cent. of grain, but you won't get as much total weight of grain. In other words, if this cane was a cob of the same length as that lead pencil, you would get more grain around that cane than on a cob the size of the lead pencil. In this connection there is another thing to think of. It is my experience, as a general statement, that the larger the cob the later will be the maturity of your corn. That is, when you get a late variety you are very apt to get a large cob. So I would say that this is something which must be decided and determined by the individual grower. It depends a good deal on the latitude and the climate of the locality where the corn is grown. You want to be careful in increasing the size of your cob on that account, particularly if you are looking for an early variety.

Fullness of the tip and beauty of appearance are minor points. Some of you probably read the Breeders' Gazette and perhaps have read the article written by the Wing Brothers of Mechanicsburg, Ohio. I was at a corn show a while ago and judged some of their corn. They had a very fine variety of corn. It yields well and is high in quality. The corn, however, is not very smooth. On some of it the rows are crooked. I said to him one day, "What in the world do you have those spiral rows for? Why don't you breed that out of your corn?" "Well," he said, "the fact is when I started or when I decided I was going to improve my corn, I paid very little attention except to those things which

would pay, and I could not see at the time that straight rows increased the yield a particle." He said, however, that when he succeeded in getting a good variety there was a demand for it for seed purposes and the people wanted straight rows. Then he had to begin to pay attention to that element and to get something which he should have obtained in the beginning. He said that it would probably take him several years to breed it out so as to get straight rows instead of spiral rows. I know of a good corn man who says that he would just as soon have a little space on the tip of the cob. Of course, that is a matter of taste. The fact that there is a little space on the tip would indicate that perhaps the cell from which the germ develops had been improperly pollinized or fertilized. The corn is fertilized by the pollen from the base upward, and it takes perhaps eight or ten days to fertilize the length of the ear. For myself, I should choose an ear that was well developed on the tip. As soon as I found it was mature, I would endeavor to select specimens of that kind for seed purposes. In my locality particularly I would prefer to have the kernels carried out well to the tip. This may be a fancy point, but I do not think it will do any harm to pay attention to it.

Now to go back for a moment to this question of selection. In the first place, in addition to what I said about other points, we must pay more attention to adaptability. We need to select varieties that are adapted to our locality. In most instances farmers do not go very far from their own farm for the purpose of selecting seed. That may not always be a good plan. It is well to get seed and perhaps before planting it extensively to experiment with it a little to see if it is adapted to your particular locality. I think by all means it is a good plan to make an experiment station of our farms in a small way. You will find, I think, in starting to improve your corn, very likely in your own neighborhood a better variety than the one you could get from one of the corn belt states. But, as I say, the selection of the right kind should be, to some extent at least, a matter of experimentation. You may find somewhere in your own county, or perhaps in your own town, a man who has been paying attention to the question of corn breeding with the idea of finding a variety that is adapted to that locality. If you go to him and get a little of his seed, you can very often get a start that will be worth several

years to you, whereas if you have to get your seed from a locality which differs from your own to any great degree, it may take you four or five years to acclimate it. On this score-card we have given thirty-five points to adaptability. This is especially true of Dent corn in New England. I believe that we can raise more animal food per acre with the Dent variety than we can with the Flint, but, on the other hand, in the state of Ohio there are counties that can raise more Flint corn than they can Dent corn per acre. So if you are on a poor hill farm, which is not very fertile, and with hard conditions and with no special adaptability of the soil to the corn plant, I would say stick to your Flint corn; but if you are on a fertile river bottom, or on land that is well adapted to the corn plant, I should say, by all means, to try the Dent variety, because I believe you will get more animal food per acre than you will with the Flint variety.

Now as to the height of the plant and the inclination of the ear. Just a word about that. We have not paid much attention to it in New England. I do not know whether we should or not, but in the corn belt states they prefer to have the angle dipping down rather than up. They say that when they have wet weather in the spring that the water is apt to soak in, and that they get more mouldy corn from corn which stands up straight. They paid a little attention to it at the Illinois Station, and found that they have an increased length of the arm or length of the branch upon which the ear is borne. That is not a very important point, however. It is one of the refinements.

Now trueness to type. A good dairyman does not have as many different types as he has animals. He has a good type right through, one which represents, at least to some extent, his ideal, and it is necessary in order for you to get ahead to know what you are breeding for, and what you are after in the development of the corn plant. I want to get a good heavy ear. But one of the important points to look at is the kernel of the corn. Now I would like to say in connection with corn shows that we are trying to hold some corn shows in connection with the Grange meetings. I have already gone to two or three. If you hold corn shows, and I hope you will, because it is good to get together, look at the kernel of the corn every time. It is the kernel that is the crux of the whole matter. Take the kernel

out and study it. See the size of the germ, the extent of its development, and generally how it is situated. It is a very important point to study the kernel. If you study the kernel carefully you will not have much disappointment in the weight of the ears, because you will soon learn by an examination of the kernel to know what sort of an ear is going to be produced. Now that is particularly so in judging in the field, when selecting your seed. You want, of course, to produce vigorous plants, and a plant that will grow up as high as you think it should be. If your corn is running too high, why choose a plant that is shorter, but aim all the time to get uniformity of type, or true-ness to type. You may have to change your ideals, but you should work for that type.

Just a word about the care of the seed. Having selected the seed, I believe it should be dried artificially, if possible. I believe that our high yields are due to the fact that we have taken care of our corn and got it pretty thoroughly dry. It is very essential to keep the seed under conditions where it shall be free from moisture or heat, which will not in any measure start germination until the proper time comes. In the corn belt states they have carried on some experiments along that line. I visited Wisconsin, and at the Experiment Station Professor Moore took me into a basement where he kept the seed. There he had a place where he had packed the corn up in tiers. The conditions were such that I said to him that I should not think he would get any germination, but, as a matter of fact, his seed was handled in such a way that he was able to tell within a very small percentage of just what per cent. of germination he was going to get. He claimed to be able to get germination of ninety-eight per cent. I wonder how many here know the per cent. of germination of the corn used for seed before it is put into the ground. If the corn which is to be used for seed is thoroughly dry, it will then stand extremes of temperature without damage.

I would also advocate, both for those who practice field selection and those who do not, germination tests. I do not know how much you have done with germination tests, but you can do it in small shallow boxes. Take a box and mark it off, put in about two inches of dirt in the box, and then draw strings

carefully across the top in both directions, so that you divide it into two-inch squares. And then start at the upper left-hand corner, and number them 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, etc. Into each of these squares put seed from one particular ear, and either number the ear so that you can identify it with the square into which the seed is put, or else tie a string around it in some way so that you can identify it. By then keeping a careful watch of the box you can get a very good idea of the germination qualities of the different seed. The germination tests will pay. I have done it many times with a student helper, and I have been enabled to tell whether I am going to get ninety-eight per cent. of my corn to the acre, or whether only about fifty per cent of it will grow. It is a very important point, and the tests can be carried on so simply, that it is something that I recommend to you all.

Now, then, just a suggestion that I want to make with reference to the selection of corn for improving the varieties of corn that we have in Connecticut. Of course, you know in Illinois they have paid a great deal of attention to these different questions in regard to corn and the Illinois Station has issued considerable literature. I was there in 1906, and among other things they had a plot of high-eared and also low-eared corn. That is, they had selected an ear that was high and also one that was low on the stalk. They carried that on for a number of years. The high-eared corn had become low, and the low-eared corn had become lower. There were more nubs (?) between the ground and the ear. The high-eared corn was later, but although the low-eared corn was a week earlier their results showed, as published recently, just as much corn was produced on the low-eared plot, but it was on smaller plants, and it was a week earlier. It seems to me that there is a suggestion for us in New England, because it is universally the fact that if you reduce the number of nubs between the ground and your fruit, you will get an earlier fruit. The fact that they did not reduce their yield, it seems to me, ought to be of assistance to us. We can get a smaller plant with a larger ear, and that is what we should select for. I want to say in this connection just a word about fertilizer. Most legumes are good in the preparation of a corn field. Corn can be raised simply on fertilizers, and can be raised densely, as has been shown by the Rhode Island

Station, but it is certainly advisable not to do it. I do not know of anything that is more valuable on the field than legumes preceding the corn crop. Any of the legume plants are valuable. A legume that you sometimes use on your tobacco field, and a good one, is winter vetch. Farmyard manure is good so far as it goes. We can use farmyard manure as well as fertilizers. We use a small amount of farmyard manure either the first or second year. With us, the general custom has been, so far as rotation is concerned, to put on about two crops of corn, then two or three years of grass. The first crop of corn we cut for green corn and the second crop we put into the silo. It is possible to raise corn simply on fertilizers alone, but I think it damages the land, and the better course is to adopt the principle of rotation. In the end you get a better result.

Now possibly what I have said may remind you of the old story of the boy who had a new brother. The nurse took him in to show him the new arrival, and he said, "That baby has not got any hair." "No, Johnny," said his mother, "no hair yet." "Why, mother," he said, "mother, that baby hasn't got any teeth." "Why," he says, "I believe we have been stung. I believe it is an old baby." (Laughter.) Well, I cannot help feeling that these few points that I have gone over in connection with the corn crop seem like an old story to you, and yet I do think, gentlemen, that if we will pay more attention to this old story, we will get a much better yield of corn.

I think perhaps I had better let you ask any questions that you wish, and not attempt to talk to you further. I will not guarantee to answer your questions, but I will be pleased to tell you what I can.

The PRESIDENT. We would like to have the audience ask any questions they may think of.

QUESTION. Wouldn't you advise four stalks to the hill.

Professor FORD. On extremely fertile land that might not be too much, but for the average New England soil I should say three was enough.

QUESTION. Would you take last year's corn in preference to this for seed?

Professor FORD. I do not think I would in preference, but I think it is a pretty good plan to keep a little of last year's corn

on hand. I think you will find that last year's corn will be a little bit earlier in maturity.

QUESTION. You think that four stalks to the hill is too many?

Professor FORD. Well, as I said, it depends something on the variety that you are raising, and also on the fertility of your soil.

QUESTION. Professor, won't you go into that question of the adaptability of the Flint and Dent corn to New England?

Professor FORD. We have not carried on any long series of experiments with reference to that, as they have in the western states, but I think what I stated in my talk has been borne out by the experience of most growers in New England.

QUESTION. On my place we used to say to plant five or six and thin to four stalks to the hill. I think that was my father's rule.

Professor FORD. Well, I think very likely you got as good a yield in that way. It reminds me of an old gentleman in the town where I was born. He believed in putting in plenty of seed. He said he wanted two for the crows and two for the crop and five for old Charles Watkins.

QUESTION. Do any investigations, Professor, tell how to keep the crows off.

Professor FORD. Well, that is a very practical question. I think a little gas tar is perhaps the best thing to use. There was a bulletin published by the Illinois Station recently recommending the use of gas tar and water, the proportions being about two tablespoonfuls of tar to ten quarts of corn. They tried to test it in different ways by feeding it to hens, but the hens refused to eat it. We have used gas tar on our corn, and we planted it by a machine. The crows pulled it up quite a little, but I do not think the crows eat a great deal of it. They find it is not very palatable. I think we can do a great deal by feeding the crows a little corn on top of the ground; that is, by putting it where they can pick it up, and in that way keep them from pulling the corn. They will not pull it if it is on top of the ground. I think the presence of crows in a cornfield helps to destroy a great many insects, and if they find some corn scattered around over the field it helps to keep them from pulling the corn.

A MEMBER. The corn has got to be scattered on the ground before you plant the corn. The crows have got to find it there before they get started pulling. If crows once get started pulling corn there is no stopping them, but if they are fed with corn so that they can pick it up before the corn comes up there will not be so much trouble.

A MEMBER. We have been using coal tar. We do not use any water, but just put in a little tar and mix the corn up in it. Some people stir in a little plaster. The crows never pull that but once. They do not like the taste of it. I would like to ask the speaker if you are planting much of the large yellow corn.

Professor FORD. In Massachusetts we are using the Leeming corn, which we buy in Illinois, that is, for raising corn for silage. We are also using a medium-sized white Dent corn.

QUESTION. Professor, there is one thing which I have been using to prevent crows from pulling corn that has not been mentioned. My experience has been that you can get something better than putting tar on the corn, because unless you get on a sufficient amount of it, the crows seem to like it, and they will pull it up and grow fat on it. The only way that we have headed them off is to use poison. We take a bushel or so and throw it broadcast over about ten acres. A bushel or two will do it. We buy thirty-five cents' worth of strychnine and soak that corn, put some strychnine into it, and sow it over the field. They find it and you will find them dead in the woods. I do not like to kill them, but I cannot help it.

QUESTION. Have any of you ever tried that preventative that Theodore Sanderson advertises extensively, called "crow-killer," or something like that?

Professor FORD. No. But I would like to ask the gentleman who has used strychnine whether he has ever tried sowing corn on top of the ground. In Massachusetts we are not allowed that method. The crow is a valuable aid in keeping down insect pests, and for that reason I think should be protected. I know in our section a good many good farmers are successful in preventing their corn from being pulled up by crows by sowing some on top of the ground.

A MEMBER. Well, if I have been doing something that the law prohibits, I shall certainly have to continue doing it until

I can find something that will protect my crop. I have tried that method of sowing corn on top of the ground, but Connecticut crows do not seem to be very decent crows. They will eat that all up and eat the other too.

A MEMBER. A few cents worth of coal tar to the acre will guarantee a piece of corn against the crows almost every time. That has been my experience. I have tried it for fifty odd years, and never worry about the crows pulling the corn. One thing, some people often get on too much, thinking that they will not get on enough. I do not think that it hurts the corn or hurts the germination, and even if you do get on a little bit more than is necessary, it will keep the dampness from it.

There is another question that I want to ask the speaker. I notice by the exhibits here today that the increase seems to be in favor of the Dent variety. I was wondering if that was becoming more and more so. I noticed in the large exhibit here today that the Dent corn seems to be the favorite. I am in favor of the Dent corn because I have raised it for fifty years, but I got out of it on account of a poor year, and I had to look around a good ways before I could find what I wanted for seed again. I am satisfied that the Dent corn will produce from twenty to twenty-five per cent. more shelled corn to the acre than the other in this locality.

Professor FORD. With reference to the Dent corn, I think there is more Dent corn raised in New England than there was a few years ago, and I believe too that you can raise more per acre, but if you are on poor land do not plant more than a small piece to start with, because I believe there are farms which are not adapted to it, and in such places it is well to try the character of your soil before you select the variety.

QUESTION. Can the Professor tell us something about fertilization? I should like to know what his views are about some of this land that is used for corn in these rough hill farms.

Professor FORD. Your success with a particular piece of land, I think, depends entirely on the preceding treatment that you have given to the land. I might say with reference to the kind of fertilizer to apply that Professor Brooks has made some experiments along that line. In all of the different counties of Massachusetts where he experimented he applied nitrogen, phosphoric acid and potash. The potash gave an average increase

of about fourteen bushels of corn, the phosphoric acid gave an average increase of about four bushels, three and six-tenths, and the nitrogen four bushels. So that the potash gave nearly twelve bushels of corn over the plot where no manure was applied, and was evidently the element needed for the fertilization of the ground. Potash is an important element to put into the average soil, and is a great help to a corn crop. The same thing was true of stover. The potash gave an increase of 1,300 pounds, whereas the nitrogen gave only 389 pounds of increase. With reference to fertilizers, we use phosphoric slag, high-grade nitrogen and nitrate of soda.

QUESTION. Do you apply that broadcast or in the hill?

Professor FORD. Theoretically, it should be applied broadcast. We have a man in Amherst who is a good farmer, and he says that he has noticed that he has gotten much better results by sowing a part of his nitrogen after the plant starts, and that you can get some advantage from the sowing of the nitrogen broadcast along the row, not exactly in the center of the row, but near the plants after the plants are up four or five inches. We should apply about one or two hundred pounds of nitrate of soda, and perhaps five hundred pounds of phosphoric slag, and from two hundred to two hundred and fifty pounds of potash. Of course, that is a very fertile farm. With reference to the slag, you will not get a very big return the first year. It does carry some lime, and, of course, lime is valuable. We need to use more lime for clover, and, of course, clover is one of those crops that is useful to rotate with on land used for corn growing.

I am very glad to see that Mr. Walker of Kentucky is going to talk about alfalfa tomorrow. We can raise it here if we only keep at it and learn.

QUESTION. How do you get rid of mice that eat the corn in the ground?

Professor FORD. Well, you have in this State an Experiment Station, to which is attached, undoubtedly, an officer called a biologist, and I should refer that mouse question to the biologist of the Station.

QUESTION. Professor, I understood you to say that crows were valuable. What are they good for?

Professor FORD. I think you will find that when you kill one on your corn field you are killing a friend. If you open

the crop of a crow, you will, undoubtedly, find a great many insects, and the insects that the crow consumes would, if left to grow and mature, do more damage than the crow would. I believe it has been definitely proven that the crow is a good thing.

Mr. HOYT. Crows will walk over the field and pick up insects, but I believe if it was not for the tarred corn we use they would not feed on the insects. It makes them feed on the insects.

QUESTION. What do you mean, Professor, by phosphoric slag? I would like to ask whether it is South Carolina rock or something else.

Professor FORD. It is something else, by-product, or sometimes called Thomas slag. It is a waste product which contains considerable lime as well as phosphate. I think our slag contains about eighteen per cent. of phosphoric acid.

The PRESIDENT. Now if there are no further questions to be asked of Professor Ford, our next speaker is with us. This is his first visit to the far east. He arrived in this law-abiding town at the unseemly hour of three o'clock in the morning. He found hardly anyone at the station, and no carriage there, and you can imagine the trouble he was in in not knowing where his hotel was located and with no one to ask. I want to say that while we are a law-abiding people and keep early hours, if there was anything to induce us to stay up late it would be to meet a man from Kentucky on his first visit here. Now he is to talk to us on corn culture, the selection of seed, etc., and I know everyone here will be interested in that, because we all know that they raise good corn in Kentucky, but it all goes into whisky, and you know the reputation of Kentucky whisky. I take great pleasure in introducing Colonel J. B. Walker of Hopkinsville, Ky. I call him Colonel, because I never dare to introduce a southern man by any other title.

CORN GROWING, SEED SELECTION, PLANTING AND CULTIVATING.

By COLONEL J. B. WALKER, Hopkinsville, Ky.

Mr. President, Ladies and Gentlemen: Really and truly, I do not think much of a title won on a bloodless battlefield. All the battles I have ever won have been with Mother Nature. I did not win all. I have had quite a number of failures.

I come before you this afternoon in a spirit of helpfulness from the far south, where the soil and the climate is so different that I feel that I may not be in reality very helpful to you after all, but nevertheless there are certain underlying principles with regard to the cultivation of corn which obtain everywhere. Corn is one of the most extensively raised crops that we have. The previous speaker has covered the ground pretty completely, but it seems to me there are some points which can well be emphasized, and I am going to touch upon a few of his points. Now, mark you, I am not here to tell you how to grow corn in Connecticut, but I am here to tell you how I grow corn in Kentucky. I returned last Saturday after a campaign of eleven weeks in this kind of work in the west, and during that time I talked more than three times every week. So you can see I am rather used to the business, and if any of you want to ask any questions while I am going along you will not throw me off or disturb me in the least bit. You need not wait until I finish. I sometimes talk quite rapidly, and you may not catch what I say. You may think it worth while to catch it, and then is the time for you to ask the question.

Now, gentlemen, the preceding speaker told you that the first necessity in getting a good corn crop was to get a good stand. Now I go just a step further than that. What he said was all right. That is a good rule, and we cannot get a good crop without it. But I want to go just a step further. I have been on farms in Kentucky where eighty-five per cent. would be stalks, that is, there would be only fifteen per cent. shy on the entire field. Now some of you might think that was a good stand, but it does not necessarily mean a good stand because you have got eighty-five per cent. of stalks there. You might find in that same row ninety-five stalks, and at the same time you might find only sixty-five of them carried an ear. If a stalk does not carry an ear, you will not get corn. You want the stand, but at the same time you want productive stalks. What the speaker said with reference to selection of seed corn was good. I want seed corn that has productive vitality. It makes a great deal of difference whether seed has reproductive vitality. It may have vitality enough to come up, that is, it will start to come up, but may be lacking in vitality to such an extent that it will only produce a little bit of a weak stalk. Now that stalk is not only non-productive, but it is apt to be a decided harm to you because the pollen from such a stock will be apt to fertilize good stalks, and thus inject an injurious element. I am going to tell you

how we select it in many parts of the country. We have brought the average corn crop up this year quite a little above what it has been. You average here in Connecticut about forty bushels, according to the year-books, while ours is twenty-six. You beat us to death. But the time is coming when you are going to do better. Now when we select our seed corn we go into the field in the fall of the year, and we try to find ears that hang down a little bit. We want that ear to hang down, because an ear with that characteristic will drain the water off. That is the first point. Now what kind of stalks do we want? We want one that is large at the base, because that is a sign of strength, and it is not so easy to blow down. Then we want one with good broad leaves, because the leaves are the lungs and stomach of the plant. Unless you have got good leaves you cannot produce a good crop. Now what kind of an ear of corn do we want? Obviously one that will yield the most bushels of corn per acre. We hear of ears of corn weighing sixteen ounces and fourteen ounces, and, of course, that is a good corn to raise, because the percentage is high, it will take a less number of ears of that kind of corn to make a bushel. The gentleman who preceded me advocated raising which would produce a trueness to type. That was a good point. If you can raise corn of a type which will produce large full well-developed ears, weighing as much as that it is a good kind to raise. In the locality in which I live we raise our corn for feed and to seed. We do not sell much corn that is raised in the Ohio River valley, or on the Tennessee river bottoms. In other portions of our state, they raise corn largely to sell. They grow yellow corn and sell it to the distilleries. We make a great deal of our corn, as the President said in presenting me to you, into whisky, but that does not mean that we all drink whisky in Kentucky. (Laughter.) I never took a drink in my life, I never did, and I don't expect to ever have to.

Now there is another thing that contributes to the growth of a good corn crop, and that is the surroundings. I will tell you this because the gentleman preceding me did not dwell on that. I think he was very kind to me, and thereby kind to you, but he evidently thought that it would give me an opportunity to say something. Suppose you find two stalks standing in a hill, one a nice, thrifty, vigorous stalk, a stalk which is sure to give a good yield, and standing right alongside of it there is one of these little shriveled up, shrunken fellows that will not produce any corn at all. Now don't take a seed ear from that

healthy looking, vigorous stalk, because the pollen from that little bit of a stalk has fertilized its good ears, and the parentage of the corn that you would get from a stalk of that kind is not good. The pollen from that small stalk has been very apt to have a deteriorating influence. Now after we have selected the seed, the next thing to do is to take care of it. I am not going into the question of the selection of the seed to any great extent, because the gentleman who preceded me has referred to most of the points. We take care of our corn seed. In most of our farmhouses in Kentucky we have big kitchens, with a ceiling overhead. We take this seed corn and tie it up together in small bunches, tie it up in such a way that there is plenty of air space between the ears. The shucks are all removed. Then the corn is hung up in these places where it is warm and dry. There is a fire in that kitchen three times every day, and the warm air goes up over and around that corn and keeps it dry. When it is kept dry it is not affected by changes in the temperature. Now then after keeping our seed in that way, when we get ready to use it, we take it down and try it out in the testing boxes. The gentleman who preceded me referred to the testing boxes, and I am sorry he did not dwell more upon that point, because it is one of the most valuable things that a farmer can have. I brought my yield of corn up from thirty-five bushels to the acre to eighty-six. That is an actual occurrence. Last year we made about eighty-six to the acre, but this year we made only about eighty. My testing box will hold three hundred and twenty ears. This is the way I work. For example, here is an ear of corn in a certain lot that we will suppose will make good seed. I put this up in the left-hand square. Then I punch a hole in the end of it, and put a piece of paper in there so as to mark it. In that way I go over all of my sample ears, and, as I said before, my box holds just three hundred and twenty ears. Now there is no better means known for finding out just what the germination power of your corn is. Farmers, a good many times, do not do just as well as they know how to do, but I know with me it is an important matter to get good seed, because I plant sixty acres of corn annually. I do not expect Connecticut people do much better on that line than we do. Now at the end of four days we take the cover off that box. Suppose there are six grains in a certain square, and we find that four of them have got good long sprouts on. Then we will find two that have not got more than two sprouts. Suppose you did find four good vigorous sprouts. Well, what does that mean? Why, it means

simply this, friends. It means that that particular seed is just about one-third better than the other. In other words, if those four grains would make that growth in four days, it follows logically, does it not, that you will get much stronger plants from that seed than you will from the other in a season of one hundred and twenty days? And you want plants with good strong reproductive vitality. Now I think I have said enough on that point. If you want to ask me any questions about it now is your time.

Now as to the preparation for planting. My opinion is that if I lived in Connecticut I would break my land in the fall. Do you do that here? Well, some of you do and some of you do not. I break my land with a three-horse plow. I suppose a good many of you people in Connecticut break your corn land in the spring. We do not break our land in the spring because our winters are open and warm, and the erosion of the soil during the warm months of the winter is terrific. For that reason we try to keep something growing on our land in the winter season. I think it is a good plan to put on some crop like clover. What my friend who preceded me said about the use of legumes on corn land was good. Now I go on to that land in the spring just as early as it is dry enough. My land has already been broken up or plowed. I go on with a disc harrow that stirs up the soil. We go over it both ways two or three times, cutting it to the depth of about four inches. In that way we mellow that land and get it in good shape for planting. You set up capillary attraction. Now corn takes its food in liquid form by capillary attraction. It takes three hundred and five pounds of water to make one pound of dry matter in corn. And you want to conserve the moisture in your land. Now when this land is ready for planting, we plant corn in hills three feet and eight inches apart each way. We plant our corn with a planter, and we set our planter to plant three corns to the hill. The machine will drop just what it is set to do from eighty-five to ninety times out of a hundred. We neither thin nor replant. We cannot afford to thin the corn, and we cannot spend the time to replant the corn. Thinning corn is a hard proposition in any case. In addition to that we do not want to replant. Now the corn is planted in that manner at the rate of from fifteen to eighteen acres a day. Cultivation comes next. Immediately behind this planter we run a roller, because there is more or less little clods of ground, and we want to get rid of these clods. Next, they are full of weed seed, and may germinate before your corn, and they will start ahead of your corn. Now the way to get rid of weeds is to kill

them quick. If a weed gets a hold in the corn field you have got something to do to kill it. We go over the field in that way and break these open, let in the sunlight and they perish. Immediately behind the roller we run the weeder. Now do you use weeders here? I use two twelve-foot weeders, and with a machine of that type we can go over sixty acres of corn in one day. A weeder needs to be used right at the time when you need it. If you wait two days too long your work will be wasted. Now we run the weeder until our corn gets to be somewhere from eight to ten inches high. We want to make as much corn as possible, and we can make more corn by going over it often. We can hire a boy to drive the mules for sixty cents a day and board. Now when the weeders go out, we put on a spring-tooth cultivator. Our spring-tooth cultivator carries five little teeth on each side, and that is passed up and down over the field. We do not want to disturb the ground to any depth, certainly not to a depth greater than two and one-half or three inches. There are two reasons why we do not want to get down too deep. The first reason is that the roots of the plant are apt to be injured, and we do not want to destroy those roots in any way; and the second reason is that we do not want to bring up any weeds from beneath that may germinate and come up on us. Now we run this spring-tooth cultivator until the corn get about that high, and then we put on a little fourteen-toothed cultivator. If you follow that method of cultivating your corn you do just exactly as we do at home. We do that to conserve the moisture and to kill the weeds. Now that implement has a tendency to throw the earth just where it is needed; and does not injure the roots. You are leaving the moisture in the land, and that is what is needed to produce corn. After we have gone as far as we can go with the spring-tooth cultivator, when the corn is up about so high, we put in this cultivator. We do that in order to kill the last weeds that may appear on the land, because our land is always full of the seed, and it is absolutely necessary for us to keep them down. We keep that process up until the corn reaches a height where it is impossible to get in without injury. Now, Mr. Chairman, I have described our process, and I think perhaps any other points that can be brought out can be brought out by questions, and I may be able to be of more use to you in that way.

The PRESIDENT. There must be some questions.

QUESTION. Do you use the weeder all the time one way, or do you cross the field with it?

Colonel WALKER. We go both ways. The first time we run the weeder out we run it as though there wasn't corn there. When it does get up we run both ways. We go over it twice if we can. I have one twelve-foot weeder without wheels. I just as soon use it without wheels.

QUESTION. Doesn't that depend on the size of the farm?

Colonel WALKER. You can turn the land with one without wheels just as well as you can with wheels, and you can get just as good results with the weeder. I would not buy one without wheels.

QUESTION. Do you fertilize?

Colonel WALKER. Yes, sir.

QUESTION. About how much do you put on?

Colonel WALKER. Well, gentlemen, I am about the worst crank on that subject you ever saw. Twenty-three years ago I bought a farm of about two hundred and ten acres. I am living on it yet. The neighbors said that the soil was so thin that they were afraid to hunt over it for fear that they would break through. I never used any commercial fertilizer on that land, but I used barnyard manure, clover and then white clover in rotation. I do not want to have you get the idea that I do not use some fertilizer aside from barnyard manure, but I do not use anything but floats, Tennessee floats. It is a sort of companion to the slag, with the phosphoric rock that is ground into fine form, and we can buy that for \$6.60. In our locality we can get it for that price, and I can get as much fertility out of that, even at a higher price, as I can with about ten times the amount of commercial fertilizer. The point I want to make is this. Our land is very shy in phosphoric acid, and the application of this form of fertilizer has proven very beneficial. With that treatment we find that we can grow cow peas and other legumes well, and we go into those to considerable extent. I have used that now for some time in connection with barnyard manure.

QUESTION. On those Tennessee floats that you speak of, how much do you pay a ton for it?

Colonel WALKER. We pay \$6.60. I presume it would cost you more up here.

QUESTION. You think that is a good thing to buy?

Colonel WALKER. Unquestionably. Of course, the freight rate would make it more here, but I do not buy any nitrogen, because that is a most expensive thing to buy.

QUESTION. Mr. President, I wish the speaker would explain a little more about his cow peas and soy beans. When do you plant them?

Colonel WALKER. We plant the soy beans anywhere from the first to the tenth of June. They are a crop in themselves. We can use them in several different ways. We can either pasture them and keep them down in that way or make hay. They are very beneficial on the soil. The roots tend to gather nitrogen, and we can fertilize that in the following crop. We grow quite a good deal of soy beans and also of cow peas. I suspect that they would be a little too slow for you people up here.

Professor FORD. We raise a few acres of them in Massachusetts.

Colonel WALKER. Professor Ford says they raise a few acres in Massachusetts, and I think it would be wise if you would get some of the seed from him. If you ever grow them, feed them to your dairy cattle and to your hogs. They are rich in protein.

QUESTION. Do you raise crimson clover?

Colonel WALKER. Yes, sir. We sow in August and early September, and cut in the following May. If you let it go too long, of course, like any other crop it is not good. A great many sow it in August as a cover crop, and then they plow it under and sow phosphoric rock. That mixes very well with the decayed vegetable matter in the soil, and the combination is immediately available for a crop. The people in my vicinity find that a very profitable thing to do. They also grow rye for the same purpose.

QUESTION. Do you think that crimson clover makes a good feed?

Colonel WALKER. Yes, sir.

QUESTION. Do you recommend giving it to all kinds of stock?

Professor FORD. I had a little experience with crimson

clover. A man lost several horses, and it was a puzzle to know what the trouble was. After some investigation it was found that the trouble was that those hard heads had formed bunches in the intestines. I do not think you will find that trouble in feeding it to cattle, but in feeding it to horses that trouble has sometimes arisen in the alimentary canal and the stomach. That subject was investigated some time ago by the United States Department of Agriculture, and that was found to be the trouble.

Colonel WALKER. I do not think you would run any risk in the silo, but we do have cattle killed by it. We do not grow very much of it. I grow mostly alfalfa and soy beans.

QUESTION. To go back again to the question of corn, I would like to ask the speaker if he can give us any idea about what per cent. this weeder that he speaks of destroys.

Colonel WALKER. I was talking up in Illinois a while ago, and there was a gentleman that sat right in front of me. I made this statement, that I could run a weeder right through a lot which would take the weeds out. "Well," he said, "do you mean that?" "Yes," I said, "I mean that." "Well," he says, "that looks rather improbable." I said, "Don't you know, my good friend, that there are lots of things that look improbable, but which nevertheless are true? Don't you know that people at one time refused to believe that the blood circulated? They would not believe it." Well now, it is just so in talking about weeds. You can do it to a very great extent with the weeder. You may break a stalk now and then in going over the field, but the amount of damage you will do is far less than the good which results. The weeder does not disturb the corn roots. The corn roots are much deeper. Of course, the main purpose of the weeder is to break up the lumps and kill the weeds.

Now I will go back just about a minute. Some years ago along in June I had been down in the cornfield, and about ten o'clock I saw a gentleman ride up to the front door. The weeders were running in the field. The weather had been awfully hot and dry, but my corn looked pretty well. Well, I walked up along and met him, and we got to talking about the crops, and he says, "It is very dry," he says, "it is awful dry. My corn is all curled up with the heat." "Well," I said to him, "mine is not. Just come down and look at it. I have just

come out of the cornfield." "Well," he said, "I think if you get in among it you will find that it is. I do not believe you noticed it." "Well," I said to him, "I do not think I should stay down there in the field four or five hours and not know if that corn was burning;" and so we walked inside the gate, and he began to look around. He looked pretty surprised, and finally he says, "What are you working this field with?" I told him I had a fourteen-toothed wheel weeder, and there were five running down there then. He examined some of the soil. It was almost stuck together. It was moist. "Well," he said, "I do not understand it. Don't those machines break off the roots and hurt your corn?" "No," I said. I scratched around and finally found a long root that had not been broken. "Why," he says, "I did not know that corn had roots that long. Well," he says, "I have not been pursuing the right method, and I am going right home and stop it." I do not know to this day what he came to my house for, but when we got up to the house he said that he wanted to go and telephone them to stop on his place, and then he wanted to come back and talk with me. Now those weeders accomplish a two-fold purpose. They break up the lumps, and bring the seed that is in them out into the sunlight, where they are killed. They stir up the soil and get it into proper condition for the corn crop to grow in.

QUESTION. How much stock do you keep on your farm?

Colonel WALKER. We have about thirty head of cattle, about twenty head of young stock and anywhere from one hundred to one hundred and fifty head of hogs. Besides that we keep a number of horses and mules.

QUESTION. Does that stock supply all the manure that you use?

Colonel WALKER. I am very careful to preserve my manure, especially the liquid manure. That is one of the most valuable parts of it. That is one of the things I take care of. And we save it just as religiously as we do anything else. If you are not doing it, the time is coming when you will all have to do it. We do not burn any straw. I do not know whether you do up here. My neighbors used to burn great ricks of straw. Some of them used to give them to me.

QUESTION. What time of the year do you apply your manure?

Colonel WALKER. I apply it pretty nearly all the year. When I cut the wheat and get the wheat out of the way, why then we can begin to put on the stable manure, and to get ready to put on the clover seed. In other words, the sooner you can get your manure onto the field the stronger and more vigorous you can make that clover, the more power it has in it to help the crop. I do not want to get onto this question of clover and alfalfa. I am scheduled to talk tonight, and that will naturally come up in connection with that subject.

QUESTION. Do you use ensilage?

Colonel WALKER. Yes, sir, I have a silo. I could not keep all that stock if I did not have it. I am a firm believer in three things, the silo, alfalfa and good pasture.

QUESTION. Which is the better crop, soy beans or cow peas?

Colonel WALKER. I would rather have the beans, I think. They are easier to handle. If you cut them at the proper stage, they make a very good crop. The cow peas run all over creation.

QUESTION. Your clover is put in, as I understand it, as preparation for your corn crops?

Colonel WALKER. Yes, sir.

QUESTION. It is grown with the wheat?

Colonel WALKER. We sow this in February. Then we cut the wheat in June, and mow the stubble. Now that clover crop we cut and put a lot of it in the barn loft for the cattle and horses. Then the seed crop comes along. What I do with that depends on how high seed is. If seed is low, and money is rather plentiful, we do one thing, but if seed is high, why then we thrash those seeds and sell them.

QUESTION. Is your farm stony?

Colonel WALKER. No, sir.

QUESTION. What would you do with a weeder if it was stony?

Colonel WALKER. Well, not having worked a stony farm it would be a guess, and you can do just about as good a job at guessing as I can. You understand I do not know your local troubles. I wish I did. I might be of more help to you. I take quite a number of agricultural papers. I try to exercise my own judgment over what I read. I think some men carry things pretty far, and I would not attempt to follow those men, or those

writers. Then again I may find another article, sometimes a couple of articles, out of which I can get enough with which, with my own ideas, to arrive at a pretty good conclusion. I believe in these days a man has got to keep in touch with what the experiment stations are doing, and it is a good thing for him to read the agricultural papers. The farm institutes are only experience meetings, and places where we learn from the experience of each other. If I do not find something here that will make me a better farmer and a better citizen I will be sorry.

QUESTION. You get quite a good many ears, don't you, for your silo, in raising corn the way you do?

Colonel WALKER. Yes, sir, we try to raise corn where every stalk carries an ear.

QUESTION. I suppose you are not troubled with frost down where you are.

Colonel WALKER. We are never bothered with it.

QUESTION. How do you utilize your stover?

Colonel WALKER. We just send it up and put it in with the rest of the corn. Every bit of our corn is utilized. Of course, a good deal of it goes through the shredder. We feed our stock shredded fodder. Alfalfa hay, soy beans, corn and barley.

QUESTION. Do you shred that corn before you put it in the loft?

Colonel WALKER. We just set the machine and run it all right through together.

QUESTION. How much barley do you grow that you use in that way?

Colonel WALKER. I grow about ten acres a year. I put in about ten acres of barley for the cattle and hogs. I can use that for pasture, you know. They eat the corn down, and then when it is ready to turn in, I can put them onto those fields. That helps out during the time when the other feed is a little short.

QUESTION. How do you pick the corn? You say that you snap it off the stalks. What do you mean by that?

Colonel WALKER. I mean that we just break it off the stalk and leave the husk on. We grind the shucks, cob and all. If we do not grind it all up we husk it. We throw the husks in the trough, and they eat them anyhow, so there is no waste.

QUESTION. It will not keep that way so well, will it?

Colonel WALKER. Well, it does with me. We break the corn off the stalks, leaving the husk on the corn. Of course, when we feed it to the horses, we pull the shucks off and leave it in the manger.

QUESTION. That is not green, that is dry, isn't it?

Colonel WALKER. Of course, if it was green, we would not feed it that way.

QUESTION. Do you feed corn to your mules green?

Colonel WALKER. Well, sometimes if we get short we may mix in a little.

QUESTION. Do you find that it is apt to cause colic?

Colonel WALKER. Rarely ever. I never lost an animal by colic that I know of, unless I lost one last Monday. There was one that the stable boy said was sick when I left. If that has died since I left for the north it is the only one.

QUESTION. You consider it much safer, don't you, to have it dry before feeding it?

Colonel WALKER. Oh, we always feed it dry. We would not undertake to feed green corn to the mules and horses unless it was an absolute necessity.

QUESTION. Do you raise any oats?

Colonel WALKER. Not much. My neighbors do, some of them.

QUESTION. You are too far south for that?

Colonel WALKER. No, that is not the reason. We can grow sixty bushels to the acre. My great trouble with oats is that they mold in the barn, and they require too much care to make them a profitable crop for me to try to raise. I can do better with something else.

QUESTION. Where you have a heavy clay soil, is it necessary to inoculate the soil in order to get good soy beans?

Colonel WALKER. It is not necessary to inoculate for soy beans. You want to get your land in good condition by proper treatment. You should have some lime. I use considerable lime, and also use the legumes to store up nitrogen. We use ground raw rock to a considerable extent. We put on sometimes as much as four thousand pounds to the acre.

QUESTION. What would be the result where you had broken up the ground in the fall and put on the lime in the fall?

Colonel WALKER. Well, I do not think it would do any

damage. I put the lime on after breaking because it is heavy and goes down rapidly. I do not believe that you can put it on at a wrong time. If you put it on after you plow it will still help.

QUESTION. You sow your lime, do you, with a machine, or do you put it on by hand?

Colonel WALKER. Well, it is a difficult thing to sow lime satisfactorily by hand. I have a machine. I have a lime spreader. I had to come clear up here to Massachusetts to get one. I am using a machine that is built over here at Chicopee Falls. I have conducted quite a lot of experiments for the United States government, and I had to have a lime spreader. The one that I have just mentioned is a very good machine.

QUESTION. Do you like soy beans better than cow peas?

Colonel WALKER. Yes, sir. I think somebody asked me that question before. I like them better because they are better to handle.

QUESTION. To plow them under?

Colonel WALKER. No. If I was going to plow them under I would take the cow peas.

QUESTION. Is your farm a level farm or a hill farm?

Colonel WALKER. I have got a place of two hundred and ten acres. It is not a hilly farm; it is not absolutely level. It rolls enough to shed the water. I am about seventy miles from the Ohio River. There is no large river near me at all.

QUESTION. Your labor is colored labor?

Colonel WALKER. Altogether.

QUESTION. Do you find that labor reliable?

Colonel WALKER. It is the best that we can get.

QUESTION. What wages do you pay those colored men?

Colonel WALKER. All the way from ten dollars a month to forty dollars a month, with board. We always board the help. You could not hire a negro unless you boarded him.

QUESTION. Do you find that you can trust your men?

Colonel WALKER. They are the best for farm hands that we can get. I have had one negro ever since I was twenty-three years old. I would trust him as quickly as I would you, or any other man I ever looked at. This gentleman asked me about boarding the help. You cannot hire negro help in our vicinity without board. In Kentucky, or most any other place in the south, wherever you work a negro you have got to board him.

And when he gets through with you, he isn't going to eat any more until another white man hires him. We furnish these people a house to live in, fuel to burn, and we furnish them all the milk they want. They have a garden spot where they can raise their own vegetables, and all that sort of thing. You have got to deal with a negro somewhat differently than with other farm help. The average negro is always more or less of a child. If they lived to be a thousand years old they would not be any different. I have a little girl fourteen years old, and she is not as childish as some of those negroes on my place. They make good help, and we get along very well with them.

The PRESIDENT. Are there any other questions about the corn proposition?

Colonel WALKER. I can assure you, ladies and gentlemen, that I have enjoyed every minute of my experience with you this afternoon, and I hope that you have. I thank you.

Professor FORD. The Chairman has asked me with reference to shocking and planting silage corn in drills. We are planting silage corn in shocks and rows. We think we can keep the silage clean cheaper in the shocks and rows than we can in the drills.

The PRESIDENT. That concludes the program for the afternoon. It is only necessary for me to say that Colonel Walker is to be here tonight. I will now declare the meeting adjourned.

SECOND DAY—EVENING SESSION.

Convention called to order at 8:15 P. M., Vice-President Wilson H. Lee in the chair.

The PRESIDENT. This afternoon when I introduced Colonel Walker he said to me, "You should understand that I am not a public speaker. I am an institute worker." My reply to him was, that I never knew a colonel from Kentucky but what could talk in public, and talk well, and you that heard him this afternoon know that he certainly can, and you also found out that he was pretty well up on corn. We think we know something about corn ourselves, but we found out this afternoon that he knew something about corn, and something about the growing and raising of corn successfully which it was very beneficial for us to know. The Colonel's address on corn this afternoon no

doubt will prove very beneficial to us. Now while he is an enthusiast on corn he is just as much an enthusiast on alfalfa, and I am sure that Colonel Walker will handle the subject of alfalfa, about which he is assigned to speak tonight, as interestingly, entertainingly and effectively as he handled the question of corn.

I take great pleasure in introducing Colonel Walker of Kentucky.

ALFALFA AND CLOVER GROWING.

By COLONEL J. B. WALKER of Kentucky.

Mr. President, Ladies and Gentlemen: This afternoon the gentleman who preceded me told a story. I told him at the supper table that he told the story that I wanted to tell tonight. Now it was not just exactly the same story, but the results are the same. We had in our county some years ago a young man who had worked on a farm until he was twenty-one. When he was twenty-one his mother gave him a birthday dinner. He told his father that he was going to leave because he was going to rail-roading. He did leave home and was gone quite a number of years. He finally became the general freight agent for the railroad company he was working for. He then made a visit home. Of course his people were mighty glad to see him. His father said to him, "In what department are you working, John?" "I am in the freight department." "Oh, a porter, I suppose?" "Do you get as much as a dollar a day?" "Yes," he said, "I get more than that." "Why, do you get as much as two dollars?" "Yes, I get more than that." "Why, John, do you get as much as possibly three dollars a day?" "Yes, I get more than that." His father looked at him with some incredulity, and he said, "Well, John, are you a-lying?" (Laughter.) Now I hope you people will not think that I am stretching the truth in what I shall say to you about alfalfa and how to grow it. Alfalfa is certainly a most wonderful plant. So far as latitude and longitude are concerned there is no sort of season why you should not grow alfalfa in Connecticut just as well as we grow it in Kentucky, or as it is grown in the west. If you do not learn to grow alfalfa it is going to be your own fault, and the man that stands up and says that it cannot be done will be

crowded out of the way. I am told that there are people in Connecticut who are already showing you that it can be grown successfully here.

There are only three enemies of alfalfa, weeds, water and acid. Now I am going to be frank with you. Alfalfa is not the easiest thing in the world to learn how to grow. I have had thirty-two failures in my own efforts to learn about it. But do not let that discourage you. Nevertheless, that is the fact. As a man who has got something for his work with alfalfa I have had thirty-two failures, but I didn't have these failures all on my own account. The United States government wanted somebody to conduct experiments in Kentucky with alfalfa, and they applied to the Kentucky Experiment Station, and Mr. Charles J. Brown, who has charge of that part of the business, visited me and made arrangements with me to make the experiments. We have had thirty-two failures, but the United States government paid the bill. Now we are growing alfalfa, growing it successfully, and as the result of our experiments with it we have learned pretty thoroughly that weeds, water and acid are its three natural enemies, but there are a few other things that you must have to go with it to make it successful. You must have a fairly fertile soil, a well-drained soil, an alkaline soil and inoculation.

Now the first thing that I would advise is to select a good site. You want a site where the ground is fairly fertile and productive, and the better that site is the better your chances will be. Then when you select that site, the next thing would be to find out whether or not your water table was sufficiently far away. When alfalfa roots reach water they die. We have heard that the roots would go to water. Well, some of them are long enough, certainly. There is no sort of question about that, either here or elsewhere, but you cannot raise alfalfa on a wet or acid soil. Now if you will dig a hole in the earth five feet in depth, and the water should stand in it to the depth of one foot, you might be able to get a little alfalfa on that kind of land, but you would not get a lasting stand. I would rather go further away from the water than that, but if you cannot get any better land than that, I would sow it there, and take my chance. You know alfalfa is a native of eastern Asia. It thrives better on high land, and upon dry land, than elsewhere, and that has been the result all over Kentucky, and I guess all over the country

so far as I have ever known. I know that has been the case in Kentucky. I have been in every county in our state but one, and there are 191 of them. You need not be afraid of stones. In fact, I think it would do well on some of the stony land that you have here in New England. I have no stone on my place, but in parts of Kentucky we have a lot of stone. I have seen alfalfa where the stone was scattered thick all over the surface and it was growing well. So stone need not bother you Connecticut people.

Now the next thing is the character of the soil itself. If your land is acid it will not grow alfalfa. It is a waste of time to try it. But how are you going to know whether it is acid or not? I will tell you. If you grow red clover abundantly that is a demonstration that this land is not acid. If, on the other hand, you do not grow red clover upon it, and in walking around you see green, these plants which indicate a sour, acid condition, such as most every farmer is familiar with, that is evidence that the land is acid, pronounceably so, and that land would not do for alfalfa at all. I do not know, of course, whether your conditions here are the same as mine. The signs are not always quite the same. Perhaps there are some men in the audience who can tell about that. However that may be, if a farmer in our state has any doubt whether the land is acid, all we have to do when we want to test our land is to take a sample of the soil and send it to the experiment station, telling them that we want them to analyze that soil, and that they will do without expense to us, except that we pay the transportation charges on the samples to Lexington. Now, I do not know whether your Station does that for you or not. How is that?

President LEE. I am not sure, but I do not think they do that here.

Colonel WALKER. Well, let your Station do that for you. The President says he does not think your Station does that. If it does not, you should manage some way to find out whether your soil is right for alfalfa, for it is not worth while to throw away your money by trying to grow it on land that is not adapted to it. You can find out anyhow. You can have it analyzed by a chemist and pay for it yourself, and that is better than not having it done at all. You better do that. Now if you want that land tested, the land where you propose to put the

crop, you better go onto it and dig holes in various places over it to a depth of six or eight inches, and then take that earth and put it together and take about a quart of that soil, or a sufficient amount of it to give a good sample, send it to the Experiment Station and tell them that you want them to analyze it and see whether or not it is acid, and if so, how much lime it is going to take to correct the acidity of that soil. I will venture that there isn't a finer state in the Union for getting lime than right here in the State of Connecticut. Lime is one of the principal things that you want in your soil in order to get a good stand of alfalfa. You must have it. I use tons and tons of it. You cannot get on any too much under ordinary conditions. As I told you this afternoon, when speaking about corn, if you put lime on, put it on and harrow it in. It sinks into the soil rapidly, and you want it to permeate the whole soil so as to get the result.

Now the preparation of the land is an important part of the process in the successful growing of alfalfa. The preparation of the land plays a very important part because in the preparation we get at the root of one of the principal difficulties, and overcome it to some extent, namely, the growing of weeds. Weeds are the bane of alfalfa. The alfalfa plant when it first comes out of the earth is a most tender, delicate plant. After it has got its growth it is tough and hard to kill, but when the alfalfa plant first comes up it is a very delicate plant indeed. I sometimes liken it unto an infant. An infant is a most helpless creature. It cannot accomplish anything for itself. It has to be nursed and cared for by others, protected and cared for, until it gets strong enough to do for itself. So it is with alfalfa. When it reaches maturity and gets its strength then hardly anything can crowd it out, but when it first comes up, if the soil is weedy, the weeds having a rapid growth, are very apt to stifle it and kill it. That is about the only thing that ever hurts it for me. Now you should go onto that land in the spring and begin to prepare it just the same as you would for any other crop. If you take the land in the fall, it does not need the same handling. It ought to be prepared so as to prevent the growth of the weeds, so that when the seed is sown for your alfalfa crop, and the young shoots begin to appear, they will not be crowded out by a rank growth of weeds. That is one of the main points. Keep the weeds down. Keep them out of the land all

you can, and let the strength of the land go to your alfalfa plants. Now when you have turned that land over in getting it ready, harrow it down and put on your lime. Whether you think your land needs lime or not, put it on. The chemists, you know, used to tell us that lime was not absolutely essential, and some of them used to say that lime was not a plant food. We had a chemist in Kentucky whom we loaned to California for a couple of years. Somebody asked him this question: Why is it that you chemists say that lime is not a plant food? And his answer was that that was an arbitrary statement, that there was lime enough. But there was not. Lime helps your land, and it is a great element in the successful raising of alfalfa. Now then you break that land up and work it down, and work it over a few days to kill the weeds. If you kill them as fast as they germinate then the weeds are eliminated. Do not plow that land up again. I had a friend in Kentucky. I came past his place one day, and I noticed him and his men out in the field where he had three big teams in there breaking that land up again. I asked him what he was doing that thing for. I asked him why he didn't put it right back into alfalfa. He said that he did not have inoculation enough, and he said that his idea was that if you did not have inoculation enough not to apply it artificially and then sow the alfalfa, because he thought if you kept on sowing the seed it would take care of itself. Well, that is not correct, of course. You must have the proper amount of inoculation in your soil. I passed on after talking with him, and in a day or two he came to my place and he says, "I have been thinking this matter over, and," he says, "I am going to take your advice. I want to borrow your lime spreader." He prepared his land and then sowed his alfalfa and had marvelous results, as good as anybody. Now talking about inoculation, if your land is not naturally inoculated, you must supply it with artificial inoculation. I want to tell you about one particular case at home. One of our Congressmen down there, one of the wealthiest farmers in Kentucky, started to raise a piece of alfalfa. The trees had been cleared off of the land, and he got that down in condition and sowed it to alfalfa. He got a fine piece. Now that simply showed that the conditions were naturally all right. He did not need to do anything, but that is not usually the case. You have usually got to supply inoculation. You cannot get good alfalfa

without it. There is no success in alfalfa raising without inoculation finally. It cannot be done. Now when you put the inoculation on the land, when you sow it on the land, sow it broadcast, and then harrow it in a little, because the sun will kill the bacteria contained in the inoculating earth if you leave it exposed, and you do not want that to happen. You want to put that on a few days before you sow the seed. Some of you may want to know where to get that. The best plan for you to pursue is to let your Station advise you about that, but if you cannot get it in any other way then do this. Do you grow sweet clover in this country? If you do, that gathers the nodules which contain the bacteria you need, and if you can get the soil from a sweet clover field it answers every purpose. Or, if you will write to the Department of Agriculture and tell them you want some earth to inoculate an alfalfa field they will send you some. Twenty pounds is enough to sow an acre. You do not want above that the first time. But some of you farmers say, perhaps, if it is such a good thing why not sow twenty acres? Well, that sounds reasonable, but I will tell you this. The chances are just about eight times out of ten that you won't succeed the first time, because you will not do as well as you have been told, so it is well to start with a small piece at first. I suppose it is just the same here as it is in Kentucky, and that is about the way it has turned out with us. The New York experiment station reports that they have grown it in about fifty different counties in the state. Your land here in Connecticut in many respects is like the land over there, and you are subject to pretty near the same climatic conditions. Their station conducted an investigation, and they found that the farmers in New York state, where they did not do anything to prepare the land, succeeded in getting a crop about one time in five. Where they inoculated they succeeded three times in five, and where they inoculated and put on lime both they succeeded four times out of five. But that was only on one acre.

Some farmers have failed to get a good stand because they did not stick to the same site. When you once get a field inoculated never change. If you can, stick to the spot and never change. That is where so many men have lost out, because when they have tried it over they have tried it on another place where the soil was not sufficiently inoculated and they have failed. If

they had stayed on that site where they commenced they would have succeeded.

I was riding the other day with some gentleman who had been shown a patch of alfalfa, about which they were telling me. A part of it was in splendid condition, but as to the remainder, why, they said there wasn't anything there at all. The owner got a man to come and investigate, and the result was that they found that some thirty years ago the land had been inoculated, or a part of it was, and that accounted for the fact that the growth was so successful on a portion of the field.

We hear statements sometimes about nursing the alfalfa. Some people laugh at the idea and say, "Well, I can't understand why anybody should say that such a rank growing plant as alfalfa should need to be nursed." Some advocate sowing barley or oats to nurse the alfalfa. Well, the question is, whether you are growing barley or oats or are growing alfalfa. If you are growing alfalfa, then your barley or oats are out of place. Well, I know the advocates of that say that they do that to keep out the weeds, and that these crops, or whichever one you put in, affords the alfalfa protection. Very well, but if that is the case, any other crop would give just about the same protection to the alfalfa, and if the object is to prevent a weedy field, that can be accomplished in another way. I don't think we want any nursed crop. Spring seeding is liable to be weedy. In our case we do not want to sow it before the tenth of August if we can help it, and we do not care to sow it later than the twentieth. We never sow it before the fifteenth of July. If we sow along in that portion of the summer that gives it an opportunity to get up and into good shape before it goes into winter quarters.

How much shall we sow to the acre? Some say fifteen pounds, some twenty, and from that up to thirty. Uncle Sam always says to sow twenty pounds. I never found it any too much. It gives me very satisfactory results. I have never sown any more. When I sow this alfalfa in July, I sow it on land which has been thoroughly prepared and worked all summer long, and which is producing very few weeds. Your season here, I imagine, is some later than ours, and you will have to be guided by that a little. The principle is the same though, to have the land prepared, thoroughly prepared, well worked over to keep out the weeds. I think it is a good plan to go over it every few

days where you can. It helps to germinate the weeds, and to get rid of them, and it helps to get moisture into the soil. I was home last Sunday, and saw a piece of four and one-half acres that I sowed in August, and it was about eight or ten inches high, and looked fine. You want it to come into winter quarters with all the growth possible. If you get it through the first winter why then you are almost sure to get a successful crop. There is mighty little chance of failure, provided other necessary things have been attended to, if you get the crop into winter quarters with a good growth.

Now if the alfalfa begins to turn yellow, don't be alarmed too quickly. That may be due to either one of two things, either that it needs lime, or that it needs inoculation, but that is not always the case. Sometimes it is hurt by cutting too early. Some farmers cut it a little too early or because of unfavorable conditions it starts to get yellow. Well, in the beginning, I don't think you want to mow such a piece as that the first year, or pasture it any either, and you will usually find that the next year when that alfalfa comes along it will be better.

Now I told you that I sowed about twenty pounds of seed to the acre. With us that seems to be about the right quantity to get a fine smooth stand, and then you want to cover those seeds with a very light harrow. A weeder is an ideal thing. I prefer to cover the seed with a weeder rather than to use anything else. The weeder covers them to just about the right depth. You can roll it if you want to. If you cover them as much as an inch the plants never will come out. Therefore do not cover your seed too deep. After putting the seed in, and covering it, going over with a weeder or a roller, or with a bush drag, which some of you Connecticut farmers use, then go off and leave it alone. It will take care of itself for a while.

The next spring when the alfalfa begins to grow the question comes up, "When shall I cut it?" That plays quite an important part. As I have already told you, if you cut it too soon it is bad, and if you cut it too late it is worse. Many people have said that it should be cut when about a tenth of the blossoms appear. Well, that is not a very safe rule to go by, because I do not know how many have appeared. There is a way to tell, however. Alfalfa has a habit, the plants themselves have a way of indicating when the time has arrived when the hay should be

harvested. They send out a lot of new shoots, which start out around the base of the plant, and when they start out it is time to cut because the young alfalfa comes right on strong. If you cut it too soon, the alfalfa stand is very apt to be hurt, the growth is checked, and then weeds and other foreign matter get in and have time to choke and spoil the crop. On the other hand, if you delay it too long, then you get a woody, coarse, poor hay that is not of as much value for feeding purposes. It weighs more, it is true, but it is not as good to feed.

I have not said a word about pasturing alfalfa fields. A field of alfalfa makes an ideal place for hogs. The hay makes a splendid fodder for cattle or sheep, and some let their sheep run over it for pasture.

Now these processes that I have described, the preparation of the land, the inoculation, planting and making of the alfalfa hay, cover about all the points that I wanted to touch on, but if you want to ask any questions, why, I would be glad to have you do so.

QUESTION. What do you call sweet clover?

Colonel WALKER. Sweet clover is the kind which has a small yellowish white blossom. That is an ideal plant on poor land. It will reinvigorate the land and make it better every day in the year. You take an old abandoned farm and get that to growing on it, and it will make it better every day it is there. I have heard about the abandoned farms of Connecticut.

Secretary FANTON. We haven't got as many as we had.

Colonel WALKER. Your Secretary says that you haven't got any now. I don't believe you will have many when you farmers get to using alfalfa. Sweet clover doesn't make so good a hay, but if you have a field that is not productive, if you can get sweet clover to growing upon it, it will be of great benefit.

QUESTION. I did not know but what you called sweet clover was the ordinary red clover. We grow lots of that here.

Colonel WALKER. No, sir, what I call sweet clover is the small clover with the yellowish white blossom, and when you take it and twist it or crush it a sweet odor will exude from it. That's the only safe way I know of to tell it, because it will fool most anybody.

QUESTION. How does it improve the land?

Colonel WALKER. It carries some kind of bacteria that

accumulate about the roots that seem to be very beneficial to the soil. Like alfalfa its roots penetrate the soil, accumulate nitrogen, and very tenacious of life. It will improve your land wherever it comes in.

QUESTION. Would it be a good thing to sow with the small grain in the spring?

Colonel WALKER. The finest kind, yes, sir. You could not do a better thing than that.

Doctor JENKINS. Mr. President, I should like to answer one question which was asked, in regard to the testing of soils for acidity by the State. The Station for many years has done a good deal of soil testing. The only difference between Connecticut and Kentucky is that in Kentucky you pay the express charges on the packages to the Station and in Connecticut they leave it for the Station to pay. We are always glad to test samples of soil for acid.

QUESTION. How much lime do you put on?

Colonel WALKER. All the way from fifteen hundred to four thousand pounds. If we use caustic lime we do not put on more than half as much as the raw. When it is burned it is caustic, and it is dangerous, because it burns the humus out of your soil. I prefer the raw lime rock because the raw rock will last longer in your soil and does not burn the humus. For that reason I prefer to use the raw rock.

QUESTION. How about air slacked lime?

Colonel WALKER. Why, that is the burned lime come back to its original condition; taken in air and taken in water.

QUESTION. Is it a good lime to use?

Colonel WALKER. Yes, sir. If you cannot get the raw rock or anything better, I should use that.

QUESTION. You spoke about the site for an alfalfa field. As I understand it, it does not want a damp, low land, but you recommend planting it on high land.

Colonel WALKER. Alfalfa is a native of Asia. There you find it growing on the mountains thousands of feet above the level of the sea.

QUESTION. Is it necessary to irrigate alfalfa to get a successful crop?

Colonel WALKER. In some of the arid districts in the west and southwest I believe they have irrigated it, but I do not think

it would be advisable here. Of course, in some arid districts they do irrigate it and make a success of it for that reason. The alfalfa plant does take up water. Of course, its roots go down very deep. It doesn't dig down into the earth to get water, but, as you all know, the plant naturally has a very long root—I would be afraid to say how far they go down in some cases, because you would think that I was not telling the truth.

A MEMBER. The President says they go down thirty-five or forty feet sometimes.

Colonel WALKER. I have a friend who was in Amsterdam, Holland, and he tells me that he saw an alfalfa root there seventy-two feet long. I know he saw it because he told me about it. I would just as soon swear to it because I have known him all my life, and I know he is truthful. It is a common thing for the roots to go down thirty-five or forty feet.

QUESTION. How many years will it live?

Colonel WALKER. Why, I should say anywhere from five to twenty years. If water is sufficiently far away from it there is no reason why it should not last fifteen years. Of course, sometimes a disease attacks it, but if it has any enemy like red clover I have never come in contact with it. I have seen some over nine years of age, and it is as good now as it was the second year.

QUESTION. How do you fertilize the fields in getting it ready for a stand?

Colonel WALKER. You people up here I think should sow your alfalfa in July, so as to give it a chance to get a good growth a little while before the weather turns cold. In getting the field ready I should go over it with a manure spreader and put on about five loads to the acre over the top of the field. I would do that with young alfalfa even though it had a pretty good growth in the fall.

QUESTION. Have you ever tried wood ashes?

Colonel WALKER. No, sir; we do not use wood ashes because we cannot get them. I wish I had ashes. I would use them if I had them. We have no wood ashes because we all burn coal.

QUESTION. There are a good many brought in here from Canada.

Colonel WALKER. We can get floats which carry a large

percentage of lime. We can buy these floats cheaper in my section. We do not need potash so much. I presume you get a good many ashes here.

QUESTION. How often do you cut your alfalfa crop? How many times can you cut it during the season without injury?

Colonel WALKER. Why, I should say from three to five times. We frequently cut it four times, and where it begins early in the spring, why we can get easily four crops. It depends somewhat on the season, but from three to five crops.

QUESTION. How many tons will it yield you?

Colonel WALKER. The largest cut I ever had was fifteen tons, or three tons to the acre from two cuttings.

QUESTION. How do you cure your alfalfa hay?

Colonel WALKER. Now you are getting around to hay-making. I do not want to monopolize the whole evening, because you have got a Connecticut man who is going to talk to you about alfalfa, and I presume he will take up that question of alfalfa hay. I make hay differently from what you do. You have heard the old adage that it is a good plan to make hay while the sun shines, but I do not make it in the sun. I cut my alfalfa immediately after the sun commences to go down, and I rake it up in windrows. Now when I get that raked up, I go back and move over those windrows, shaking it up with the hay rake. Of course, that allows the light and air to circulate freely underneath. There is a difference between cutting hay and cutting grass to make hay. If it lies on the damp ground it will not wilt, and the point is to have it cure and still retain the goodness that is in the grass. So in curing the alfalfa hay we go over the windrows so that the air will circulate through it and cure it. We do not spread it out where the hot rays of the sun dry it, but roll it and keep it in the shade all we can.

QUESTION. Do you cock it up at night? If you expect a rainstorm coming on, do you cock it up?

Colonel WALKER. No, sir. This year I bought a lot of hay caps. I am going to use those. We cock it up enough to put the caps on, but we do not do that ordinarily.

QUESTION. How long does it take to cure it?

Colonel WALKER. Well, that depends, of course, on the weather. If the weather is dry and crisp, it takes about a day. That is a hard question to answer definitely, because you cannot

tell how long it does take to cure hay. If we get good weather and cut the hay today, tomorrow afternoon it will go to the barn. But you understand we have to roll this hay three times before it goes to the barn. The next morning, as soon as the dew is off, we commence to roll it, and to kick it up so that the air circulates through it. If the atmosphere is in such shape that it cures rapidly we can get it in sooner. You know this plant gives off moisture through the leaves. If you leave those leaves to begin to sunburn, it will not give off the moisture in the way that they should to cure it properly, but if you keep it in the shade, why, it gradually passes out, and the curing process is very much better. Then when it is put in the barn it keeps better.

QUESTION. Do you mean that it cures faster in the shade than in the sun?

Colonel WALKER. Yes, sir.

QUESTION. If you use the caps, you can leave it out there several days, can't you, without damage?

Colonel WALKER. Oh yes, but I did not have any until this year. They proved practical and profitable. I should not want to leave my alfalfa out any longer than was necessary to give it a good thorough curing in the dry crisp air.

QUESTION. What size caps do you use?

Colonel WALKER. Why, those that I got this year were heavy domestic caps about forty inches square.

QUESTION. Do you put any of your alfalfa in your silo?

Colonel WALKER. I never put it in my ensilage. I think it is good enough the other way. Corn is not so good. Alfalfa is mighty fine as hay. I never feed any as ensilage at all. I do not think I will under the conditions which seem to exist at the present time. I never put anything in the silo except cow peas, soy beans and corn.

QUESTION. Do you know whether that has ever been tried?

Colonel WALKER. Oh, yes, I believe experiments along that line have been tried in a number of places. I believe it has been tried in Wisconsin. I do not remember the others.

QUESTION. Was it successful?

Colonel WALKER. Unquestionably so.

Now if you are not going to ask me any more questions, I want to talk for just a few moments on why you should grow

alfalfa here. First, because it will produce more dry forage than any plant I ever had any connection with. It will produce more digestible protein than any plant I have knowledge of, and that is what you want. Why do you want it? If I was home in Kentucky, I would dwell something on protein. I believe I will consider it for a few minutes anyhow. Do any of you know what part the white of an egg plays in the hatching of a chicken? I have asked a good many men that question, and it is hard to get an answer. Well, the white makes the chicken. It makes the down and the bill, and it makes the red meat. What part does the yolk play? Why, that is the infant food; part of the food which nature has provided for the infant chicken. It is full of nutritious qualities. Now why do you want protein in your feed? You want it to make red meat, and such parts of the body as the head, the hair, the horns, the hoofs and bones. It carries a large percentage of lime. It is a very necessary element in the upbuilding of the body structure. Now the more of that sort of an element you can get in the food which you give to your cattle, or other stock, the better. I do not know how you people feed your hens up here, but in Kentucky we give them all the corn they will eat. Now alfalfa is good for them. When timothy hay is worth twenty dollars a ton, alfalfa is worth eighty dollars a ton, and why? Because of the large percentage of protein which it carries. About three per cent. of protein, about three pounds to the hundred, clover about six and alfalfa about twelve. That is what ordinary wheat bran carries, but we pay twenty-six dollars a ton if we get it, and we cannot afford it. We cannot pay twenty-six dollars a ton for wheat bran to use, even in the dairy industry. The President says that is about what you pay. You get, it is true, a good deal more for your milk, but you get a good deal less for yourselves. That is the fact of the case. We get protein in alfalfa, and we do not have to buy bran. I would not expect that you would expect to get a cow and just feed her a little timothy alone, because she would soon lose on the job. She would dry up. Now with alfalfa it is different. You could keep her along for a longer length of time. Now that gives you an idea in a very crude way of the value of alfalfa as a feed on your farm. Now what will eat alfalfa? Every animal on your place. The hens of the farmhouse will get in among it in the barn. They will get in and

scratch among the alfalfa. They like it. You will have hard work to keep them out of it. Those hens get protein from it. It is good for them. That is not all that alfalfa will do. It is good for your horses. It is good for your cattle, good for your hogs, as well as being good for your chickens. You know they even grind it up now and sell alfalfa meal. I expect that some of these fine mornings in Kentucky they will be giving it to us for a breakfast food. Now that is not all. Some of you might say though that we have soil in Kentucky twenty feet deep. Well, we do have some in Kentucky that is that deep, but even though we have twenty-foot soil we do not have among the ordinary crops anything which takes the goodness of the soil to any such depth with the exception of alfalfa. The roots of the alfalfa go down into the bowels of the earth, and take up the goodness of the earth from the lower layers of the soil. We haven't got anything equal to alfalfa to go down and get the plant food that is down there. Alfalfa will. The roots go down deep, and they bring up the potash and other elements, conserve the nitrogen, and deposit it near the surface where it is available. It draws more nitrogen than any other substance, and alfalfa possesses more power to get it out of the earth or out of the atmosphere than any other plant that I know of. I believe that the alfalfa plant is more valuable in gathering nitrogen from the air than any other we grow. I have been raising it for a long time and know that you can get from three to five crops a year. Of what other grass crop can such a statement as that be made?

Some of you may have heard the story about the old Yankee who asked the people in the south why they built their chimneys on the outside of their houses. He noticed that the chimneys were built on the outside of the houses in a great many instances, and so he asked the question, "Why do you build your chimneys on the outside?" The old colonel that he asked the question of turned and looked at him, and he says, "My Yankee friend, I can tell you why we do it — because there is more room outside." So it is with alfalfa. The alfalfa plant has got all the room outside of the earth from which to gather nitrogen, and it is a better gatherer of nitrogen than any other plant we grow. It is not an unusual thing for a good stand of alfalfa to yield three crops of five tons a year, and in one instance I knew of a field that contained seven hundred and fifty pounds more of

nitrogen than it did before, and there was an increase in the phosphoric acid and in protein also. It is a wonderful plant. It is wonderful not only as a conserver of chemical elements necessary for plant food, but because of its power to enrich the soil by gathering nitrogen from the atmosphere.

QUESTION. Did you ever plow a piece of alfalfa ground?

Colonel WALKER. Oh yes. When you have a job of that kind on hand your team and the man will both know that they have been plowing.

A MEMBER. I would not have said anything about that because, of course, you do not want to plow it up unless you have to. My experience is that it takes you just about four times as long. It takes just about four times as long to plow a field that has been seeded down to alfalfa as any other crop I ever had. You have got to stop your team every few minutes. You cannot do it with a chilled iron plow. You have got to have a steel plow.

QUESTION. Isn't it dangerous to feed horses on alfalfa hay alone? Isn't it too rich for them?

Colonel WALKER. Well, alfalfa hay is a feed that carries quite a large percentage of protein, but I do not think you can feed too much of it to your horses. I do not think there is much chance of feeding them too much. I think you can feed it to better advantage though. We would rather feed it to a cow. Cows like it and they will pay better under it. We can feed horses shredded fodder.

There is just another point. I do not know how much you people pay for cotton seed meal.

The PRESIDENT. About thirty-one dollars a ton.

Colonel WALKER. Well, suppose it is forty dollars. It carries a very large percentage of protein, and bran carries only twelve per cent. Now which is the cheapest? Why, I would not think about bran if I could buy cotton seed meal, because it carries almost three and one-half times as much protein. If they were nearer the same price, why, I should give bran the preference, but with prices as they are, and with the protein content of the two made up as it is, the cotton seed meal is much the cheapest.

QUESTION. Did you ever sow cotton seed meal as a fertilizer?

Colonel WALKER. Yes, sir. It carries quite a large percentage of nitrogen. It is fine.

QUESTION. You wouldn't feed cotton seed meal alone, would you?

Colonel WALKER. You can use it in the silo all right. You can feed it in silage, but it is not altogether advisable. When we feed cotton seed meal we do not feed any alfalfa or clover, but we feed it with silage. We do not husk our corn as you do. When we feed it to cattle we grind it up and mix it up with other things.

QUESTION. How does alfalfa do on stony ground? As I understand it, you want pretty fertile land to have the crop do well. Where there are so many stones as there are in some places in Connecticut I should not think it would do very well.

Colonel WALKER. I know of no reason why alfalfa will not do well on stony land. If I had some stony land and did not have the other I would try to grow alfalfa on it, and I think I could do it. Stony land is most always upland, and I do not see any reason why it would not do well on some of this Connecticut upland. It will grow on stony land, and it is far better for you to put it there because it keeps your mellow lowland for other crops.

QUESTION. I suppose the alfalfa roots will bore right into the stone and stand up.

Colonel WALKER. I do not know about that. I remember I picked off a root this past year that was over five feet long that was boring into a piece of sandstone.

The PRESIDENT. Are there any other questions to ask Colonel Walker? If not, we have a Connecticut gentleman with us tonight, who knows something about raising alfalfa. We claim him in New Haven. He was a graduate of Yale, but he went up to a small town and established a large industrial plant there, which he was fortunate enough to sell out to a trust, and then another trust wanted him, and they finally made him the vice-president of the American Hardware Company. We consider him one of the best business men in the State of Connecticut. He is in the foremost rank, and has been for the past few years experimenting in farm life, and I think if he tells you the truth here tonight, he will say it is the hardest job that he ever undertook. Now Colonel Jarvis of Connecticut is what Colonel

Walker is in Kentucky—he is our alfalfa king, and I take great pleasure in introducing Colonel Jarvis, the alfalfa king of Connecticut.

ALFALFA IN CONNECTICUT.

BY COLONEL CHARLES M. JARVIS, Berlin, Connecticut.

Mr. President and Gentlemen: I am a little bit embarrassed by this method of introduction. I was also much amused by Colonel Walker's statement that he had made thirty-two failures in raising alfalfa. I was rather gratified to hear him say that, because I thought that perhaps I had made more failures than any man in America in attempting to grow that wonderful plant. I have been at it for eight years, trying to do something and have failed time and time again when I felt that success was near at hand. I will have to ask your pardon while I confine myself pretty closely during my talk to my notes.

The human family is subject to some strange and oftentimes unexplainable propensities. We here in New England are conservative; sometimes we are called ultra-conservative and because of such conservatism we doubt and discredit many of those things which we know, or ought to know, that we should adopt. Alfalfa is one of these. We have all heard of alfalfa and the stories that we have heard have been so large in all their details that, generally speaking, alfalfa has been discredited almost universally by Connecticut farmers.

A few days ago it was my pleasure to have a short conversation with ex-Senator Harris from Kansas. I found that Senator Harris was a farmer—a breeder of Shorthorns—and in reply to my inquiry as to alfalfa in Kansas he made the remark that beyond any question of doubt the great prosperity which Kansas had enjoyed during the past ten years more or less was due almost entirely to the development of alfalfa, that is, to the large quantity of alfalfa grown by the farmers of Kansas. Why cannot the farmers of Connecticut enjoy that same prosperity? We can, if we only realize our opportunity.

When we talk about getting a crop of eight tons of clover from one acre of land year in and year out it is pretty hard to believe it, and yet it is a fact that in some parts of the country where they practice irrigation they do get eight tons of alfalfa hay from an acre of land, and alfalfa is known in some parts of Minnesota as "Ewiger Klee" or everlasting clover, and was

introduced into certain sections of Minnesota as everlasting clover.

All of us who read and travel and observe know that alfalfa is a species of clover; that in some parts of the country it will grow from three crops to six crops per year; that it will grow from four tons to eight tons of cured hay per acre. And yet, we here in Connecticut go along in our same merry old way year after year and do nothing about taking advantage of this information which we do not deny, and most of us know is correct.

The three great objections which I have heard advanced against alfalfa in Connecticut are as follows:

First: You cannot grow alfalfa successfully in Connecticut.

Second: There are other crops which are more profitable for Connecticut farmers than alfalfa.

Third: It takes too much time, too much trouble and too much work, and consequently too much expense to raise alfalfa to make it a popular crop among the farmers of Connecticut.

After an experience of eight years, with probably more failures and more mistakes than are generally allotted to the ordinary farmer, I have no hesitation whatever in denying each one of these assertions, and I believe can prove beyond any question of doubt that exactly the reverse is true. That

First: You can successfully grow alfalfa in Connecticut.

Second: Alfalfa is the most profitable crop a Connecticut farmer can raise.

Third: That alfalfa is the most economical crop in labor and expense that a Connecticut farmer can grow.

The first proposition — You can successfully grow alfalfa in Connecticut. I know this assertion to be true, for I have mowed now for three years from two to three acres of alfalfa, cutting from it three crops each year, the total yield being about five tons of well cured hay per annum per acre, and the field is better this year than it was last year, and it was in better condition last year than it was the year before. Furthermore, I have fifteen acres in addition to the above which was sowed during the fall of 1907, which was cut three times this year with a total yield of about four tons per acre. I have twenty acres more that is going into the winter in good fair shape, so that, extraordinary exceptions excepted, I shall have nearly forty acres of alfalfa on my farm next summer. Every Connecticut farmer knows from practical experience that the past three years have been the most unsatisfactory of any years for a long period on account of the small amount of rain which has fallen during the summer months and all grasses need — yes, they must have — moisture.

I say that I cut from my eighteen acres, more or less, of alfalfa during this summer three crops. The first crop was about three tons to the acre — perhaps a little more than three tons to the acre. The second crop ran about a ton and a half to the acre and on the old alfalfa field the third crop ran about one ton to the acre, but on the new alfalfa field, which was seeded last fall and was cut for the first time this season, the yield was a scant one ton per acre. Understand, please, that these are not measured acres, neither was the hay weighed, but the acreage was approximately measured (not guessed at) and the tonnage I believe was conservatively estimated. Please also understand that when I say a ton of alfalfa I mean a ton of well cured alfalfa hay and not of green grass. The assertion which I make is, therefore, for the past three years I have cut from two to three acres of alfalfa five tons of well cured alfalfa hay per acre per annum, and that during the past summer I have cut from fifteen acres not less than four tons of well cured alfalfa hay per acre, and I want to make the further assertion that neither of these fields had one ounce of fertilizer on any portion of the field, except the original fertilizer which was put on at the time the seed was sown. Understand, please, on my two to three acres I have cut each year on an average five tons per acre of well cured alfalfa hay for the past three years and that no fertilizer of any kind has been put upon any part of this field, except the original fertilizer that was put on the field when the crop was planted. If this is not success, I do not know what is success in growing crops, and I, therefore, have no hesitation in saying that four tons of alfalfa hay per year is easily obtained from an acre of almost any of our cultivatable land here in Connecticut. In other words, that any of our good average soils here in Connecticut will raise alfalfa if we will only have the patience to follow carefully a few rules which are absolutely necessary in order to grow this crop.

Second: Alfalfa is the most profitable crop that a Connecticut farmer can raise. It is generally conceded that the most profitable crop which our farmers produce here in Connecticut is tobacco. I know very little about raising tobacco, as I have had little or no experience and consequently I am compelled to rely upon the judgment and the experience of others. Men who are experts and have raised large fields of tobacco for a number of years tell me that year in and year out, good years and bad years, taking them altogether, with all kinds of weather, all kinds of conditions and all kinds of prices for the finished

article, that tobacco will net about fifty dollars per acre. Understand, please, I am talking about net figures, that is, what the farmer has left after paying all expenses of the crop, including the interest on the investment. I believe these to be ultra-conservative figures, as some tobacco raisers tell me that they can net as high as one hundred dollars per acre, but I am inclined to think that taken year in and year out, good years and bad years, successful years and years of failure, taking all the expense, that the net profit on tobacco is somewhere in the neighborhood of fifty dollars to seventy-five dollars per acre.

We have at East Hartford a Mr. Brewer who is famous as the greatest corn grower in America, that is, he has produced the largest crop of shelled corn on a measured acre of land. Last year I think this was in the neighborhood of one hundred and thirty-three bushels, and this year I believe I have seen the statement made that he produced about one hundred and twenty-eight bushels to the acre. This is something very unusual. My experience is that a farmer who can raise one hundred bushels of shelled corn to the acre of land is doing very much better than the average. According to the *United States Crop Reporter*, during the past ten years we have raised in Connecticut an average of thirty-six and six-tenths bushels per acre, although the average for 1908 and 1909 was forty-one bushels per acre. For the whole United States the average during the past ten years has been twenty-five and eight-tenths bushels per acre. As a matter of fact, during the past ten years Connecticut leads all other states in the average production of corn per acre, so that when I assume in making comparison that we can produce one hundred bushels of corn per acre I am assuming a first-class, way-above-average yield. One hundred bushels of corn is worth, generally speaking, fifty cents a bushel or fifty dollars. The stalks are an uncertain quantity, but I believe that when corn stalks are properly cured and properly handled they are worth as much as the grain, or an additional fifty dollars per acre. Of course, if we feed the stalks in the old-fashioned way where the stock eat little or nothing but the leaves, they are worth not to exceed ten dollars or twelve dollars per acre, but I believe with careful planting, careful cultivation and careful care of the crop that our corn crop here in Connecticut can be made worth one hundred dollars per acre. This, you understand, is gross. I think it is the Wisconsin experiment station, at least it is one of the experiment stations in the northwest, that has made a careful estimate as to the cost of producing various crops,

and without being able to consult the exact figures, I think they claim that corn can be raised and the crop housed for fifteen dollars per acre. I do not know how it is with you gentlemen, but from my own experience I believe there is very little corn raised in Connecticut but what costs in actual labor twenty-five dollars per acre after the seed and the cost of gathering the crop. The fertilizer is worth at least ten dollars per acre, so that in any event a good, more than average corn crop, here in Connecticut, will net about the same as tobacco, that is, from fifty dollars to seventy-five dollars per acre. My own judgment is that there are very few corn crops raised in Connecticut that net a farmer fifty dollars per acre, but at the same time I think it possible to raise a crop of corn that will net from fifty dollars to seventy-five dollars per acre.

Now, then, what about alfalfa? At the present time it is impossible to buy alfalfa in Connecticut at less than twenty-three dollars to twenty-five dollars per ton delivered on the cars at the nearest railroad station. I have bought alfalfa hay for as low as eighteen dollars per ton delivered on the cars at Berlin, but it was a poor lot of stuff, mostly stems with quite a mixture of timothy and other grasses. It is certainly safe to say that alfalfa hay will average in value in Connecticut twenty dollars per ton housed. A fair estimate for gathering a crop of hay is five dollars per ton—any man who cannot cut his hay and put it into the barn for less than five dollars per ton is a poor farmer. In making this comparison we will, therefore, estimate alfalfa hay as worth twenty dollars per ton in the barn and to cost five dollars per ton for labor, seed, fertilizer, etc., to put it into the barn, or that the alfalfa is worth net fifteen dollars per ton. Five tons of alfalfa per acre is, therefore, worth in the barn fifteen dollars per ton, or seventy-five dollars as the value of the yield of alfalfa hay per acre. Right at this point let me call attention to Bulletin No. 339, issued by the United States Department of Agriculture at Washington, which gives the comparative value in dollars of a few of the common feed stuffs.

“ Alfalfa hay per ton \$20.16
Clover hay per ton \$14.12
Timothy hay per ton \$9.80
Wheat bran per ton \$22.80
Shelled corn per ton \$20.16.”

From this you will see that a ton of alfalfa hay is worth nearly fifty per cent. more than a ton of clover hay, more than

twice as much as a ton of timothy hay, almost equal to a ton of wheat bran, and exactly equal to a ton of shelled corn.

These figures here would make the value of alfalfa hay higher than I have estimated, but I want to be conservative on these figures because I want the farmers of Connecticut to understand what this alfalfa crop means. Right here, let me say that I do not house my alfalfa, but stack it in the field with a canvas cover, because, to be candid with you, I am afraid to put it in my barns for fear of spontaneous combustion. Insurance people tell me that their statistics show that more icehouses burn than almost any other class of buildings and that their losses from the burning of farm buildings in alfalfa raising districts are greater than in any other farming districts, consequently they assume, and I believe rightly, that alfalfa is a dangerous crop to house on account of spontaneous combustion.

But that is merely incidental. I offer for your consideration tobacco at fifty dollars to seventy-five dollars net per acre, corn at fifty dollars to seventy-five dollars net per acre and alfalfa hay at from sixty dollars to seventy-five dollars per acre. Have I not—I leave it to you—proved my second assertion, that alfalfa is the most profitable crop a Connecticut farmer can raise?

This leads up to the third objection that has been offered, that it takes too much time, too much trouble and too much work to bother with it, to which I reply

Third: It is no more work to grow alfalfa than it is any of our ordinary grasses. Four tons of timothy hay per acre is a large yield—I will venture the statement that there are more fields of timothy hay that grow one ton per acre than there are that grow four tons per acre. My friend Mr. Daniels of Middlefield wrote me last fall that he had some timothy that he thought would run four tons to the acre, and Daniels Brothers are about as successful and reliable farmers as there are in this State. I think the average yield as given by the Department of Agriculture at Washington (I am only quoting my memory and not from the book)—the average yield here in our State is about one ton and a quarter to the acre. You are all familiar with the time and expense and trouble it takes to raise hay—taken year in and year out it is the cheapest crop in labor and material probably that we produce.

Clover—I do not know how it is with the rest of you gentlemen, but I cannot raise clover without first liming my land. I have tried clover several times and have never been able to get any kind of a crop without the use of lime. Clover is a crop that

lasts for two years and it is a mighty good crop of clover that will cut five tons to the acre during a season. I think it is safe to assume that two tons to three tons of clover hay on an average year is about as much as a man can expect. Now, then, we know about how much it costs to raise timothy and to raise clover and to raise any of our ordinary grasses, but how do you go at it to raise alfalfa? What is there about this alfalfa propaganda that is so startling in its cost?

In the first place, you cannot raise alfalfa without lime. There are spots in the western part of the State where there is a lime formation underneath, where the land probably will not require liming, but generally speaking Connecticut soil ought to be limed not less than one ton to the acre. My own experience is that the fresh burned, finely ground lime, which one can buy of the Stearns Lime Co. at Danbury, Conn., is the cheapest and best lime to use in growing alfalfa. I have tried several other kinds. The ordinary air-slacked lime is pretty expensive because of the large amount of water that it contains. Many people are adverse to using fresh burned lime for fear it will hill out the humus in the soil. I have tried the various kinds of lime and found no trouble from using fresh burned lime. Ordinary fresh burned lime will increase in bulk from twenty-five per cent. to fifty per cent. in slacking and will absorb pretty nearly that amount of water, so that you can readily see that dollar for dollar, pound for pound, you are getting a good deal more value in the fresh burned lime than you are in the slacked lime. I believe in liming all soils here in Connecticut and I also believe in giving them a full measure, that is, one ton to the acre.

The second absolute necessity in raising alfalfa is to supply the soil with bacteria. I do not attempt to go into the science of the growth of alfalfa, only to say that it is absolutely necessary in order to have a successful field of alfalfa that the soil be inoculated with about five hundred pounds of soil from a growing alfalfa field. There is no use to try to raise alfalfa successfully in Connecticut without inoculating the soil.

Now then, my friends, I have, through the agricultural press, tried to tell you all of the mistakes which I have made in the past few years in trying to raise alfalfa. We learn more from our mistakes than we do from our successes, and I want every farmer in Connecticut to understand that while alfalfa is, to my mind, the best crop he can raise and costs but very little more to start than it does to start a good crop of clover, yet there are a few rules that must be carefully followed.

First: The soil must be limed and the lime should be applied at least thirty days before the seed is sown.

Second: Bacteria must be applied from a field of growing alfalfa at the rate of about five hundred pounds per acre.

Third: Alfalfa should be sown in Connecticut not later than the first of September and as near the first of August as possible, that is, assuming that you are sowing it alone without any nursing crop.

Fourth: If you want to sow alfalfa in the spring, sow it with beardless barley or oats as a nurse crop — cut the beardless barley or the oats as they come to milk for hay and do not let them go to grain. ♦

One word more, and that is in reference to curing alfalfa. We all recollect how our mothers and our grandmothers went out and cut their catnip and boneset and hung it up in the shade of the attic to dry. Why did they do it in this way — because the part of the catnip and boneset that they needed for use was the leaves and they found by hanging it up to dry in the shade that the leaves adhered to the stalks. Use the same common-sense in curing alfalfa. Cut it in the morning as soon as the dew is off. Cock it up in the afternoon before the dew falls and put a cap over it and let it cure in the cock. In this way the leaves will adhere to the stalks and the leaves are the best part of the alfalfa.

There are in round numbers three million acres of land in Connecticut. One million of acres is occupied by our lakes, our rivers, our ponds, our swamps and our cities. One million of acres are almost thrown away in what we call sprout land — we might call it poor pasture land. There are about one million acres of land in Connecticut that are cultivatable and that are under cultivation. Nearly all of the one million acres of sprout land or pasture land will grow alfalfa. Our average crop production here in Connecticut is something about twenty-five million dollars. Turn one million acres of this sprout land that I mention into alfalfa and grow five tons of well cured alfalfa hay to the acre and it means eighty million dollars. Turn half of it into alfalfa and it means forty million dollars — reduce it sixty-six and two-thirds per cent. and it means a crop equal to our present crop yield, a crop equal in dollars and cents to our present crop yield.

Ladies and gentlemen, here is food for thought.

Now then, as far as possible I am ready to answer any questions that I can.

QUESTION. Mr. President, I would like to ask the speaker

if he had a small farm and no money and a large family if he would try to grow alfalfa?

Colonel JARVIS. I would if the farm was not too small. I think a crop of alfalfa, even a small crop, will be of great help to a farmer that keeps any stock.

QUESTION. You stated that alfalfa must have water. I should think that would be one thing in its favor in Connecticut. It will go away down in the ground and get all the water it wants, and around here you can usually find water within a short distance of the surface.

Colonel JARVIS. It must have water in order to make it successful. The last three years, you know, have been dry ones, but I have cut five tons to the acre right in these dry years, and I assume that I could have got better crops, and a much larger per cent. of yield if the seasons had been more favorable. At one time I had about seven or eight hundred feet of pipe running out into one of my fields to carry water. There were some leaks in the pipe, and where these leaks were located the alfalfa appeared much more excellent in condition, so that I assumed that if we had had more rain we would have got more alfalfa. I do not know but we ought to be satisfied with five tons to the acre, but I think if we had a little more water than we did in the last couple of years the crop would have been better.

QUESTION. You spoke about a million acres of land in Connecticut being sprout land. It would take some little time to get that land down into condition. It is a little rough in places, and it would take a lot of hard work to get much of it into condition to sow with alfalfa so that it could be mowed. A good deal of it is rocky land that is practically useless for anything except pasture. I do not think you could do very much with a lot of that for any crop.

Colonel JARVIS. Well, I am not talking about rocky land, of course. I am talking about ordinary sprout land that is reasonably free from rocks. There is a good deal of that land that is well located to raise good alfalfa. I saw down on Long Island last Saturday a piece of sprout land where they had cut off the bushes and pulled the stumps, and they had a first-rate good looking piece of alfalfa.

QUESTION. What I wanted to know was what your opinion

was as to whether I had better try to break in some of that land and put it in to alfalfa or put it in to corn.

Colonel JARVIS. If your land is suitable for alfalfa, I should advise it. I think it will pay better than corn.

QUESTION. There are very few of our farmers that raise corn that get fifty bushels to the acre. That is a good deal above the average in Connecticut, according to the figures that have been given here.

Colonel JARVIS. In making the comparison between alfalfa, tobacco and corn, my idea was to give the tobacco and the corn the maximum of value, and it would be reasonable, as my own experience tells me in reference to alfalfa. Assume that alfalfa hay is worth fifteen dollars. Alfalfa hay is worth more than that. You cannot buy it and get it into your mow for less than from twenty-eight to thirty dollars. So taking those figures as the basis, you can see about what the land will yield you with a good stand of alfalfa.

QUESTION. You would not sow this with barley and oats, would you?

Colonel JARVIS. I sowed about half quantity last year. I made up my mind that I would sow it a little bit thicker than that. I made up my mind that the next time I would sow a little more. I think our Kentucky friend said that he sowed about twenty pounds of alfalfa seed to the acre. My own experience here is that we need a little more than that.

QUESTION. Do you think that this alfalfa hay would do for our city customers? A great many of the larger wholesale houses, wholesale grocers, etc., have teams and horses. Do you think they would pay for that?

Colonel JARVIS. I have kept horses on alfalfa for six or eight months, and have seen no bad results whatever. I have a team of mules that do not get anything else, and have not for some time, and they work hard all the time. My own opinion is, based on my own experience, that the first growth of alfalfa hay is all right for horses. The second and third growth is not so good.

QUESTION. You do not think they would buy it here in New Haven and pay such prices as you have quoted for it, do you?

Colonel JARVIS. I suppose there is some market for alfalfa

hay, but I think that you would make more money by giving it to your cows than you could by selling it.

QUESTION. Colonel Walker said that the land wanted some preparation and fertilizing before the seed was put on. You tell us that it don't require any fertilizer. What has been your experience?

Colonel JARVIS. I did not make that assertion that it did not need any fertilizer. I think I said that it did not matter much after you got it once established. We tried that for an experiment. I put on about twenty cords of manure to the acre. Now I had not put any fertilizer on that two to three acres in three years. I do not know whether that is the way to do it or not, but my own idea is that we ought to have put about five cords of good manure on every winter with a manure spreader. I do, however, make this assertion that I have grown five tons of alfalfa hay for three years on land that was only fertilized the first year.

Secretary FANTON. Our Vice-President, Mr. Lee, is an exceedingly modest man. In fact, that is characteristic of every member of the Board of Agriculture, but especially so of Mr. Lee, our Vice-President. (Laughter.) I had to play my very best card in order to get him to consent to address this audience tonight. While he never did consent to having his name put on the program, and I had to do my very best to overcome his objection to speaking, then I ventured to put him on after I had reminded him that I would put on two other good men for the same evening. I leave it to you to judge if I did not fulfill my part in putting on two good men for the same evening. It gives me great pleasure to introduce Mr. Lee, our Vice-President, who is to speak to us for a short time.

DAIRYING IN EUROPE V. CONNECTICUT.

BY VICE-PRESIDENT WILSON H. LEE, Orange, Conn.

Gentlemen: I remember in my boyhood days that we used to have up in the Massachusetts town where I spent some of my early days the *Boston Herald*. The reporter for the police court used to write up the daily happenings in a most interesting and entertaining way, and in such an entertaining manner that the men that came up before the judge and were given ten days and costs, when they read the *Herald* the next day, would really think

that he had favored them. This reporter was given to drinking himself at times, and one morning he landed in the police court. In the report in the *Herald* the next day he did not spare himself. He started his report in this way: "This morning I find myself among the number." Now when I looked at this program here today and found myself among the number, I felt something like the child that was sent upstairs by the mother, and told that when the father came home he would be sent up to punish him. The boy, hearing the father come, crawled under the bed to get out of the way, and the father coming upstairs and seeing that the child was not there, knew well where he was, and so he got down on his knees and commenced to crawl under the bed. The boy looked at him and he says, "What have you been doing, dad?" (Laughter.)

Now I see my subject here is as to what I have observed in dairying in Europe. I was fortunate enough to make a trip on the other side this summer, and being a lover of Ayrshire cattle I wanted to land in Scotland. I never will regret or forget that beautiful September morning when we arrived at the mouth of the Clyde, and when we started up the river on that boat. The distance up the river gives one a sail of about ten or twelve miles, and at times the scenery is very interesting. The shores of the river are dotted with shipyards and other industries, but by far the greater part of the banks along on both sides were covered or occupied with farms laid out like a checker-board. Fields of alfalfa, fields of wheat, fields of potatoes, all of which gave a variety to the scenery. These fields were all divided with hedgerows, so common to the old country. It was a sight that I wish every one of you could have seen. I never will forget it. It was my first sight of a foreign land.

Over there, as you have heard, they have the Scotch mist. They get that about every day in the year, and this year when I was there they had more rain than usual, and that made the fields unusually green. Now, as I have said, the fields that are occupied as pastures were covered with Ayrshire cattle, of which I, among others, am fond. We arrived in Glasgow, and after a good dinner, it being too late for church, I said to my friend who was with me, and who loves the farm as well as I, "Now let us find out where the good farms are." We asked the hotel man, and he told us to take a car and go down to a park, and he said that in that vicinity we would find some of the best farms in northern Scotland. We did as we were directed, went down to this large park. There was a fence dividing the park from

the street, but over on the other side I saw a half dozen very handsome Ayrshire cattle. I asked a man coming along, who looked as though he might be a farmer like myself, if that piece of ground belonged to the public park, and he said, "I do not know, sir, but I know they don't allow you in there." I took my chances. I scaled the fence. I was bound to get close to those cows, and I will say to you, gentlemen, that I have seen a great many of them in this country, I saw a great many of them over there, but I never saw six such cows in my life. After admiring those, we made inquiries as to where there was a farm, and we were told that there were some in the vicinity, but that the people probably would not let us into the buildings. There was a gentleman there from the country that said that he knew the man that lived down the road, and he said, "I see that you are interested in these matters, and I will go along with you." He took us down to a farmer's home, a thrifty Scotchman perhaps thirty-five years old. His front yard looked like all of those places over there. When they get time to cultivate them and make them as beautiful as they do, I do not know, but in nearly all of them there was a beautiful garden with flowers. We went around to the rear of the house, met the man, and he took us into his barn. It was on one end of the house. The barn had cement floors, no windows; all the light and ventilation came from the roof. Not a place I would like to keep cows in. Between the cow stable and the main part of the house was a sort of washroom for their dairy or utensils, or where they did the household washing. Then the kitchen. It had a stone floor. They took us all through the house. It seemed to be very comfortably furnished. The farmer had about fifteen cows, and he kept things very neat. He was supplying milk to Glasgow market. He got about five cents a quart for it. He told us that his farm was not what we wanted to see, but that the one we wanted was down below, and he says, "I will go down there with you and introduce you." So we went down to the next farm. This farmer had about twenty-five to thirty cows, and as I looked over his herd I saw that they were not as good as those in the park. And I said to him, "You have a very good herd, but I saw some fine animals up here by the park." "Oh yes," he said, "those are Lord So-and-So's. He has about two hundred head. Those six cows are selected to show at the fairs throughout the country." So you see that was the reason that I happened to strike those very good cows. Then as we went into the second barn they were milking. His wife and two hired

girls did the milking. I went along to the wife, a woman perhaps thirty-five years old, with red cheeks and a good strong physique, a typical Scotch woman, representative of that class. She had on a sort of canvas dress and wore heavy shoes. She was dressed for milking. As I went along to her I said, "Madam, it is not necessary for me to tell you that I come from America, and in that country we make the men do the work that you are doing here." She and those two girls who were with her were doing the milking. The girls were hired for about ten dollars a month, and they were doing the housework, and incidentally helping to perform a portion of the farm work, with one man that he had to help him there. On inquiring, I found that that man held that farm under a lease, such as most of the farms over there are held under. Most of the farms are lease-hold property. He had about one hundred acres, and there was not a piece of it as large as the top of that table that was not under thorough cultivation or in pasture. Every inch of it had to be utilized. He was paying one thousand dollars a year rent for the farm, and his ancestors had paid the same rental before him. There were hedgerows all through it, and he was obliged to maintain a certain standard of fertility on the farm. All of his products were sent to market. He was selling principally milk, which was sold in the Glasgow market at five cents a quart. There it was retailed at from eight to nine cents. He informed me that they were paying what would amount in our money to from ninety to one hundred dollars apiece for the cows that he had in his barn. The same cows could be bought in this country for from fifty-five to sixty dollars. There is one thing in that country that was striking. As you go around you do not see anything but Ayrshire cows. When you get into England it is principally Shorthorns. When you get into Holland it is all Holsteins. They do not mix the breeds there as we do here.

Now our next stop in that country was in Melrose. I thought of the "Lady of the Lake" as I went through there. The mountains are covered with thousands and thousands of sheep, and the members of the Sheep Breeders' Association here this morning, and the ones that are here tonight, would have liked to have seen the sight that I saw. After doing the home of Sir Walter Scott and Melrose Abbey and other places of interest, I said to my friend, "We must not lose any more time, but we must visit some farms;" and so we started out to do so. We were directed where to go to find some of the best farms in the vicinity. We went up to the front door of the house. The front

yard was filled with flowers the same as the other, and I rather expected to find the same inviting conditions in the barn as we had seen in those other high-class farms. We rapped at the door, a Scotch lady came out, and we told her who we were and what we wanted. She said, "I will call my brother." She called her brother, and he said that the first thing he would show us would be his barn, because his cattle were out. So he took us out to the barn. Well, I thought I had seen some filth in barns in this country, but I gave it up when I saw that Scotch barn, that Melrose barn. It beat anything that I have ever seen for nastiness, and I got out of it as soon as I could. The odor was too much for me. He then took us into the hills and showed us a herd of about twenty-five Ayrshire cattle. They were beautiful cows. It was a beautiful herd of cattle. A fine field, and the herd was installed in fine grass land. Excellent pasturage. When it came to the care of the milk and cleanliness in his stable he did not know the first principles of it. After admiring the stock, and noticing another good barn and another good set of buildings, we asked whose those were, and we were told that they belonged to Lord So-and-So. It was regarded as one of the best farms in that country. We asked if he would allow us to visit it, and he said yes. Now these barns were what would be called in this country, I suppose, modern. The ventilation was from the top, and when you got inside I will tell you, gentlemen, they were very defective. We were expecting when we saw the exterior of those buildings, together with the fine house, the front yard filled with beautiful flowers, etc., that we would find cleanly conditions there, but again we were disappointed. The conditions were not quite as bad as the other, but still they were conditions that any of you here should be ashamed of. I am going over these matters very briefly because the hour is late.

The next farm I visited was the royal farm at Windsor Castle. I was quite anxious to visit Windsor Castle. I told them that I was going to visit Windsor Castle, and that I was going to visit the cow barns first. I inquired for the stable. I was directed to the stables, but as they understood what I wanted was the horse stable, they sent me to the horse stable, where I found from one hundred and fifty to two hundred horses and ponies kept for the royal family. I had seen the king's stables in London, and had no time to waste on horse stables. So I asked to be directed to the cow stables. "Sir," I was told, "it will do you no good. They will not allow you to see those stables." "Never mind," I said, "will you tell me where I can

find them?" "They are down here a mile and a half." I started for the cow stables. I went down there in the broiling sun, and went to the farmer's house and presented my card, and was told that he was not at home. "Is his wife in?" "Yes, the Missis is in," they said, and I told them I would like to see her. Soon the good lady came out and invited me into the front room. I told her who I was and what I wanted to see, and she says, "You wait a moment." She brought me out a note to the herdsman, or head farmer, and allowing me to visit every part of the royal stable. I was not so much disappointed. The barns were beautiful. They cost perhaps one hundred and fifty to two hundred thousand dollars. The cow stables were of brick, and were better constructed and ventilated than the ones I had seen before, although not as well ventilated as we think desirable in this country; still they were very good and were light. They had in that herd about sixty head of beautiful Jersey cows, and some young stock. They have at the royal farms a herd of Shorthorns. Everybody in England has Shorthorns. Those Shorthorns they keep to show at the country fairs, and the Jerseys they keep for dairy purposes; in other words, to supply milk, cream and butter to the royal family. These barns, as I said, were built of brick. The stables were very well ventilated and arranged, the feeding arrangements were good, but not on the whole as well up to date as a stable of that grade would be expected to be arranged in this country. They had a dairy building. I looked at it, and I should say that it cost perhaps one hundred and fifty thousand dollars. It was a beautiful building. They had a large milk room with beautiful frescoes, and there were statues about it, which cost a great deal of money. It was very handsomely decorated. Their method of handling the milk and their way of cooling the house was by the use of running water. They did not use a separator. I did not see a separator while I was abroad. I understand that they do have some, but I did not see any.

The women do the milking almost universally. In the royal stables I do not think they do, but in all the others that I saw the women did the milking. Their method of cooling the milk was not quite the same as ours. They had been told though that it was the proper thing to cool the milk by a cooler, so they had purchased a cooler. Back of the approach to this dairy was a little building with a roof over it, and the cooler was set up and run out there. I asked the lady in charge of the dairy room if she considered that was a good place to keep that cooler out there where it came in contact with all the dust that was flying.

"Oh yes," she said, "we did have it in the dairy room, but we didn't like it there, and it was more convenient to put it out there," and so they had moved it. The butter for the royal family and cream is pan-set cream. At the side of the room there were narrow marble tables, and two marble tables running down through the center, and under these marble tables they have cold water running, a continuous stream, and that is the only cooling that that room gets. The milk is shipped to London every day.

One other milk farm I visited in London. This man had a Shorthorn herd, and he was up to date. He was one of the few in that country that were cooling milk in a modern way. They do not know anything about the cooling of milk by the use of ice. His stable was constructed in the same manner as most of the English and Scotch ones, with no windows, and all the light and air had to come from the center ventilator, like the ones that we saw in Scotland. In discussing the situation, I asked him why he kept Shorthorn cows. "Why," he says, "we buy cows here, milk them out, and let them go to the butcher. True, we do not get as much production of milk but we do not think that we can afford to keep anything but Shorthorn cows for our dairy, for the reason that they bring such a large price from the butcher." And all through England it is the same way. Most of their herds are composed of Shorthorns, but in certain herds they are introducing some Jerseys. All through England most of the farms, as I have said to you was the case in Scotland, do not have a piece as large as the top of that table but what is producing something. Their fences there were of the best. The fences were principally hedgerows. Their fields are as even and as free from stone as any field that you ever saw. If there were ever any stone they have been removed from time to time until they are entirely clear from stone.

In dairying and the care of milk we are ahead of them, but when it comes to crops we are, as the boys say, "not in it." They are raising two to one of what we are on our land. Feed for their cows as well as a great many crops. They raise a great many potatoes and a great many oats. They feed considerable oil cake, but their main reliance, so far as I could see, was hay, potatoes and oats. As I have said, they raise double what we do on a given acre. One farmer does not try to cultivate all England. He only takes a very small portion of land, in fact, he cannot, as the land is very valuable, and he is obliged to get the largest possible production from a given acre in order to make ends meet and pay his rental.

Now I have talked along in a rather desultory way, but just one word further in regard to Holland. It would do you good, you that have not seen Holland, to go through there and see those beautiful fields. The whole country is practically as level as the floor of this hall. Their fences and dykes that run up and down through there are extremely well built and attractive. Throughout you see only Holstein cattle, and many of those. Many of the farmers live and stable their cows in these windmills which you have seen pictures of. All of you have heard about the neatness of the Dutch farmer, and all farmers they claimed to me are neat. They do not want to tell me that any more. I was in Amsterdam one day, and the worst situation that I have ever seen in the dairy line met my sight in Amsterdam. We just visited a diamond factory, and some one hearing that I was interested in seeing a farm said that I might be interested to see a cow stable a few blocks away. I told them that I would, and he took me over there, and took me into a cow stable in the center of the city of Amsterdam. The ceiling was not over seven feet high if it was that. The light was admitted from two small windows. A small stable, and in that small stable were at least thirty great Holstein cows. I do not think any of them had seen any outdoor life for a year. Perhaps some of them had not seen it for five years. It was the filthiest place that I ever saw, unless it was that Scotch stable. The feed for those cattle was what the dairyman purchased from the hucksters that lived in an adjoining street. Refuse fruit, rotten fruit, refuse and rotten vegetables that they could not sell were sold to this dairyman to feed to this herd of thirty cows. I wondered that the people of Amsterdam who purchased the milk coming from such cows tolerated such a condition. Talk about cleanliness in Holland. No one need ever talk to me about Dutch neatness after what I saw. I saw other conditions which were better. I saw some on an island just outside of Holland, where it was all fixed up with flower pots all about there, and all that sort of thing. Fixed up for the tourist season to fool Americans and others that go over there. That is about the size of it. In that particular case the conditions were neat and fairly good, but those conditions do not prevail generally throughout Holland. As I say though, they may be in certain places, as on the island of Marquee, where most Americans are taken, it is simply a show place. Of course it is a very interesting place to visit, and it is a place that all ought to go, but it is fixed up for your benefit.

Now, as I have said, I would be very glad to answer

any questions, but I have taken more time than I intended, with the lateness of the hour. If there are no questions which you care to ask, I will ask the Secretary to adjourn this meeting until tomorrow morning at 10 o'clock.

Meeting adjourned.

THIRD DAY — MORNING SESSION.

Music.

Convention called to order at 10.20 A. M., Vice-President Lee in the chair.

The PRESIDENT. Before we start this meeting I believe our Secretary has an announcement to make.

Secretary Fanton makes announcement with regard to return railroad certificates and reduction of railroad fares.

A MEMBER. How long are those good for?

Secretary FANTON. I think until tomorrow night.

There was something of the same misunderstanding on the part of the express company. The arrangements were all made for express packages which our exhibitors wished to send here to be received by the express company, and when I arrived here I was to pay all charges. You know how independent some of our companies are. Consequently, on the part of a few of you there was some little delay, and if any of you prepaid your charges on the corn which you sent here for exhibition, if you will notify me of the amount, it will be refunded to you. We intend to carry out that agreement. So in case you did prepay your packages, simply notify me of that fact, and the amount will be refunded to you.

QUESTION. Let me ask about the return of these packages. Do we have to pay the charges for returning them?

Secretary FANTON. There has been no arrangement to return the packages. Possibly there may be some question about the charges being prepaid on account of the value of the package. Whether a package containing the ears of corn sent here for exhibition is of the value of the return express charges, I am unable to say. Of course, if there was very much of it, it could be returned by freight.

A MEMBER. Mr. Chairman, as many of those who have corn here who would like to have it sent to the College, if they

would let me know if they do not care to pay the return charges, I would be glad to have the corn packed and shipped right to the Connecticut Agricultural College.

Secretary FANTON. I want to say just another word in regard to the prizes. The awards have all been made, and if any of you gentlemen who are interested will go below in the basement of this hall you will find that the names of the prizes are all on at the present time, and the names of the winners of the prizes will be given here before the close of the session. The corn was not judged as early in the session as we intended to have it, on account of the fact that one of the judges did not arrive as soon as was expected. The idea was to have all the corn judged yesterday morning, and in the afternoon have the judges lecture on the corn, giving a demonstration showing why they gave first prize to this exhibit and second prize to that, giving us a demonstration of the way they judge corn, why they judge the corn thus and so, but we were not able to carry that out according to our original idea when we arranged for this convention.

The PRESIDENT. It is a very interesting subject which we have before us this morning. We have gone to a neighboring state for a speaker. We have gone to one of the best institutions of its kind that we have in this country — Cornell University. I can say this to you, sir, that I have had three or four of your boys at my place, and they all showed that they had had excellent training.

The subject this morning is "Animal Husbandry." I take great pleasure in introducing Professor H. H. Wing, who will talk to you on that subject.

Professor WING. Mr. Chairman and Gentlemen: I think that perhaps I owe the Connecticut State Board of Agriculture an apology for the title of my subject. I would not have you for a moment think that I had the temerity to advertise myself to speak upon the whole field of animal husbandry in the time that is allotted to me. When your Secretary asked me to come here I did not know just what sort of animal I could place before you, and he put the subject down on the program in this broad way as a favor to me, in order to allow me to make up my mind at the last moment just what I could best present to you. So I shall not speak upon animal husbandry as a broad subject, but confine myself to the rather narrow field of having

to do with the improvement of a certain class of animals. I am accustomed to telling my students that the man who breeds and rears animals is not worthy of his calling unless he has in mind the improvement of those animals, either in themselves or through their descendants. The domestic animals that we use are so far removed from their wild ancestors that in many cases we cannot even recognize them, and we do not even admit that we have reached the limit of possible improvement in our domestic animals. Our study must always be how to secure a greater degree of improvement that shall make these animals more useful to us. We keep them simply because of their use to us, in the case of farm animals, and not for the pleasure of their society.

Now you will frequently see references made in the agricultural papers and elsewhere to the great skill that has been attained by individuals in the breeding of animals, and the skill with which the breeder has produced a certain notable animal or family of notable animals, but when we come to trace the principles that these men have used, we are often struck with the fact that far too many of our great animals have been, after all, produced by accident, and that their owners did not really know that they were producing a notable animal at the time it was born. While we do know quite a good deal in respect to the facts and principles that underlie the reproduction of domestic animals, our knowledge is at best fragmentary and uncertain. We keep domestic animals for the sake of their product, or for the sake of the products which are useful to man. In all breeds and varieties of domestic animals there are practically only two at the present time where the performance of the animal in respect to product has been used as a basis for selection in future generations to secure still greater improvements. I refer to the dairy cow and the trotting horse. The breeders of these animals are the only ones, perhaps, of all men who, to a slight extent, use the performances of their animals as a criterion for their selection. A hundred years ago such a thing as breeding a trotting horse was unknown. Fifty years ago it was practically unknown. Within the last fifty years without paying much attention to anything else except speed, the trotting horse breeders have not only reduced the time materially within which a mile can be trotted, but they have increased the number of individuals much more rapidly than they have increased the certainty of transmis-

sion of the quality of speed from the parent to offspring. The breed has been made in fifty years by paying attention to nothing else but performance, because the American trotting register was founded on performance alone, and continued for many years along that line. The breeders of dairy cattle recognized this fact or this principle about twenty-five years ago, and a society breeding one branch of what we know as the Holstein breed was the first to attempt to record the performances of the animals that had made a certain amount of performance in a separate register for that particular breed. From that small beginning up to the present time we now have all of the dairy breeders recognizing performance as equal to lineage in establishing the value of an animal for breeding purposes. At the first these performance registrations were based upon performance and depended upon the reliability of the owner. The record was based simply upon his statement of what the animal had done. In 1894 the Holstein-Friesian Breeders' Association made a step in advance, and asked for the certification of the record of a private owner, and they asked for this certification through the officials of the various state agricultural colleges, and now the other breeders have followed their lead, and now we find all the leading dairy breeds basing their advanced register record upon an official certification by disinterested parties connected in some way officially with agriculture, usually by teaching or experimentation, and these records are called official records.

Now of what use is the record of performance to the breeder? The mere fact that an animal has produced a certain amount of milk or fat, and is thereby entitled to advanced registration, is of little use unless we can study her performance in connection with the performances of her fellows, and use that as a basis of selection. The advanced register records are of use not as a cataloguing of certain number of animals or glorifying the owners, but to give us information in respect to the general tendency of the breed—as to which way it is going, whether up or down. That information is of use to all breeders of that breed.

If we are going up, how can we use these records, how can we study the records so as to prevent further retrogression? The advanced register records present a fertile field for the student to study general tendencies and principles so as to draw from them facts which may be of use to anyone interested, not only in

a particular breed, but in any breed having this particular tendency. So, while the few studies that we have been able to make with a certain breed are of particular interest to the breeder of that breed, they are of equal application to any dairy animal, and so I have narrowed my subject down to a single inquiry in respect to the product of Holstein cattle, as it is indicated by the advanced register records that have been made since the system was first inaugurated by the Holstein-Friesian Breeders' Association in 1894. What do we learn in respect to the production of these cattle that shall help us in the future? Now I do not know whether the Holsteins are as important a branch of the dairy industry in Connecticut as they are in New York. I am inclined to think that perhaps they are not, but in New York we are getting to be a community of milk producers, producing milk for consumption very largely, and we know the general characteristics of the Holstein cattle, and we know that while the milk is not as rich in fat as the best market demands, the improvement of the cattle or of the breed in respect to quality for their milk is a thing that while it may not always be expressed is nevertheless uppermost in the minds of the breeders of those cattle. It is quite a common topic of conversation among breeders that the percentage of fat in the milk of Holstein cattle has been increased in the last fifteen or twenty years; in other words, that they do not give milk as poor in fat as they used to give. So the first thing we turn our attention to is to study what this effect had been when we began, and then study present conditions with the idea of finding out just how much improvement had been made. The result of that investigation is given on this small chart here. I do not know whether many of you will be able to see the figures, but I think I will be able to give them to you in such a way that they will be readily understood. They are not very intricate.

PERCENTAGE OF FAT IN MILK OF HOLSTEIN-FRIESIAN
COWS TESTED FOR ADVANCED REGISTRY SINCE THE
BEGINNING OF THE ADVANCED REGISTRY SYSTEM.

Year	No.	Mode	Mean
1894-5.....	35	3.4	3.491
1895-6.....	60	3.2	3.334
1896-7.....	57	3.1	3.250
1897-8.....	68	3.1	3.276
1898-9.....	200	3.4	3.401
1899-0.....	256	3.2	3.357
1900-1.....	329	3.4	3.343
			3.350
1901-2.....	644	3.3	3.397
1902-3.....	677	3.3	3.400
1903-4.....	1014	3.3	3.430
1904-5.....	1211	3.4	3.405
1905-6.....	1590	3.4	3.398
1906-7.....	1786	3.3	3.429
1907-8.....	2041	3.4	3.470
			3.418
			.068

The first official advanced register records, as you will see, were made in 1894-95. There were only thirty-five records made that year. In the succeeding year a greater number were made. There were a little over two thousand cows which were tested for a period of seven years, and the average per cent. of fat in their milk was taken.

QUESTION. Is that for the whole country, or for the state of New York alone?

Professor WING. That is for the whole country. That applies to the breed as a whole.

As you see, I am not speaking from notes, and I shall not be interrupted disastrously to myself if I am broken in upon at any time. I hope you will be perfectly free to call attention to anything which interests you, or about which you wish information at any time.

Of the thirty-five cows tested in 1894-5 the mean percentage of fat was 3.491. Of the sixty cows tested in 1895-6 it was 3.334.

The average of the first seven years is 3.350. Now we can see that these cows, while they were comparatively small in number, they got up in 1901 so that they represented the breed fairly well, and they represented the breed fairly well because they were scattered all over the country, among breeders here and there.

Now then, going on for the next seven years, when perhaps

you might expect a larger number to be tested, we find the result to be in 1901-2, 3,397; 1902-3, 3,400; 1903-4, 3,430; 1904-5, 3,405, and so on through the list, giving the average of the last seven years, 3,418, and showing an increase in the decimal to .068, or a little less than seven-one-hundredths of one per cent. of actual increase of fat on an average of about two thousand cows. Now this does not show, taking the breed as a whole, any improvement at all, and we are forced to admit that the average Holstein cow, taking the country over, does not give milk any richer in fat than she did fifteen years ago. There has been no improvement in the average per cent. of fat in Holstein cows in the last fifteen years.

Now where did this idea come from? As I said a little while ago, most Holstein breeders will tell you that the Holstein milk is richer at present than it was some time ago. What is the basis of that idea? Now there are some factors which have entered into this situation which are worthy of attention in passing. In the first place, is the fact shown by these figures due to the fact that there are more poor cows, or do they show that there is a stationary condition in the breed? We know that the various breeders have been giving more and more attention to the improvement of their cows, that many poor cows have been destroyed, also that large records have constantly been broken until, in some instances, we have cows giving a little more than twenty-eight pounds of fat in a week. We used to think that sixteen pounds was a good record, that twenty pounds was an excellent record, but now the Holstein breeder does not think he has anything very remarkable unless he has a cow that is giving twenty-four pounds, and from that to thirty pounds. Now if there has been this constant improvement in the record of fat, the improvement must have come from the increase in milk, or, perhaps, to a certain slight extent, to other factors. Now how much does the factor of this small percentage of fat mean in the improvement of the total production of fat? We have made a little study along that line, and this study does show right well that the average percentage of fat does not increase except, perhaps, in the larger producer. In cows that have produced the most there has been an increase there, an increased percentage as well as an increase in yield.

CORRELATION BETWEEN YIELD OF MILK AND PERCENTAGE OF FAT IN HOLSTEIN-FRIESIAN COWS
TESTED FOR ADVANCED REGISTRY.

	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
250	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..
300	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	4	4
350	..	..	..	..	..	..	..	..	..	1	11	14	30	19	25	20	14
400	..	..	..	..	..	3	4	23	35	41	46	50	54	38	32	36	18
450	..	..	..	..	6	17	21	29	43	47	41	43	38	29	39	26	20
500	..	..	2	6	10	9	18	27	23	41	22	30	25	19	12	10	8
550	1	..	1	1	..	4	7	15	12	22	15	13	19	9	7	10	3
600	..	..	..	..	4	..	2	5	9	6	17	15	5	5	6	3	3
650	..	..	..	..	2	2	1	..	3	5	3	3	3	2	1	2	..
700	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
1	1	0	3	7	22	35	53	102	125	163	156	169	174	122	122	111	70
4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7
250	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
300	6	2	2	..	..	..	1	..	..	1	..	..	..	..	..	..	21
350	10	3	4	2	1	2	..	..	..	1	..	1	..	..	..	1	159
400	9	8	9	6	6	2	3	1	3	..	..	..	..	1	..	..	428
450	15	15	5	8	4	3	2	..	..	1	1	1	..	1	..	1	450
500	7	2	5	3	2	2	..	..	1	..	2	..	..	..	..	..	286
550	4	1	..	1	3	..	2	..	..	..	..	..	..	..	..	..	150
600	..	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	84
650	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	29
700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
51	34	26	15	15	17	9	7	2	4	3	3	1	1	2	0	2	1612

AGR. '10-13

On this chart, as you will see, we have made what those who are engaged in studying things of this kind call a correlation table, and we have arranged on this table the various individual animals, about sixteen hundred, and some cows tested in the last year or two in respect to the percentage of fat in their milk and the actual amount of milk yield. In the horizontal line we have placed all the cows that give a certain amount; beginning with 225 and running up to 275 we call those 250-pound cows. That is a cow that gives between 225 and 275 pounds. And then those cows running from 275 to 325 pounds are called 300-pound cows. You see they are all arranged horizontally. Now putting the 400-pound and the 550 pounds of milk cows in a week, and totaling it up, you see it gives from three and two-tenths per cent. up to four per cent. You will find in this table that quite a considerable number of the high tested cows had given a large amount of milk; while, as a rule, the more milk a cow has given, the lower the percentage of fat, as you see in this table here. Well, it stretches out quite a little, and shows quite a number of cows that still test quite high, the large record made in that way.

Now there is quite an intricate mathematical process used to express just what is meant by this system of correlation. The system expresses it in terms of percentage. We have figured this out. As a matter of fact, I do not know it very well myself. It shows in respect to this relation between the amount of milk given and the percentage of fat, when the milk with the correlation is two and four-tenths per cent. That is a negative correlation. That is very strong, and it means practically, I suppose, to interpret it roughly, that that increase, or the large record of a cow gives three parts over her yield and one part over her percentage, or, that the yield increases three times as fast as the percentage itself increases. It shows the same indication of a rise in percentage of fat, but not anywhere near as large an increase in rise in percentage as in pounds of milk given. So that while our little table shows actually very little increase of fat on the average, still, taking the cows, the large producers, there is something of a correlation along that line.

Now taking this in another way, and perhaps you will get a clearer idea of just what it meant from this table.

COMPARISON OF PERCENTAGE OF FAT IN MILK OF COWS
MAKING RECORDS OF MORE THAN THE SIXTEEN
POUNDS OF FAT IN SEVEN DAYS, WITH ALL COWS
TESTED THE SAME YEAR.

Year	Over 16 lbs.	All	Per cent.
1895.....	3.67	3.49	34
1896.....	3.98	3.33	13
1897.....	3.46	3.25	13
1898.....	3.51	3.27	16
1899.....	3.66	3.40	10
1900.....	3.57	3.36	9
1901.....	3.59	3.34	9
1902.....	3.73	3.40	9
1903.....	3.58	3.40	12
1904.....	3.68	3.43	13
1905.....	3.59	3.40	13
1906.....	3.61	3.40	14
1907.....	3.64	3.43	20
1908.....	3.72	3.47	22
Average.....	3.64	3.38	

It often occurs in undertaking a study of this sort that you will find something that you did not start out to find. We arranged on this table the average percentage of fat in the milk of all cows that had produced more than sixteen pounds of fat, and then the average of the percentage of fat in all cows tested. And this shows in each year the percentage of all animals tested that made over sixteen pounds of fat. Now we find in every case here that the cows that produced more than sixteen pounds of fat did have a little richer milk than all the cows of the breed tested that year. I think there is not a single year where the average per cent. of fat in the milk was not greater, and the difference for the whole time from 1895 to 1908 was about a quarter of one per cent. in favor of the cow that produced a large amount. So that our high producing cows are producing somewhat richer milk than the average of the breed, as shown more in detail by the other table, and this perhaps is where the idea has come that the percentage of fat in milk is increasing because, naturally, we are giving more of our attention to the cows that produce a larger amount of product. We will remember a cow that gives twenty-eight pounds a week, while we may not know anything about a cow that only gives fifteen pounds in a week. These large producing cows are producing still richer milk. The value of the fat is so much greater than all the rest of the milk that it is the only thing that we need to take into consideration.

QUESTION. Were not those cows that gave the better percentage fed better?

Professor WING. Oh yes, I assume in all cases. It is fair to assume that the food that they got was better. But the question of the economy of the product does not enter into the thing here at all. It is a question of the effect upon the animal.

Now the records of this sort have been going on long enough to enable us to study the question a little but further. We want to improve the percentage of fat in the milk of the Holstein cow. How are we going to go about it? The only answer to that would be to find which cows are giving us the increase, and then breed from them. We may assume that in the last fifteen years this has been a factor of selection, to some extent. It has not made any impression upon the breed, if we may accept these conclusions here. There has been a considerable number of cows produced that have records whose dams also have had records. What is the relation between the percentage of fat in the milk of the dam and in the milk of the daughter? Bear in mind that these have been selected cows, and in many cases the daughters were raised because of the record of their dams. Now suppose we find a Holstein cow that tests four or five per cent., or, as in one case, five and six-tenths per cent. of fat. Is she a cow that we would choose to breed from in order to get a high percentage of fat in her daughter? To study that question the following table has been prepared.

You will notice that it has been arranged in the form of a correlation table, although we have not attempted to work out the correlation. This includes 1,449 cows with the advanced register records, whose dams also had advanced register records. So we know the percentage of fat in the milk, both of the dam and of the daughter, and can compare one with the other. And this has been arranged in this way — with the horizontal lines through there, represent numbers in each space, the daughters or dams that tested the amount given at the left of the horizontal line. Of all the cows whose percentage of fat was three and eight-tenths, their daughters tested as follows: one tested two and eight-tenths, another two and nine-tenths, this one tested three and one-tenth, eight tested three and two-tenths, and so on along right straight through. The vertical lines show the daughters. Of the cows that tested three per cent., two of them had dams that tested two and six-tenths and three of them had dams which tested three, three of them that had dams which tested two and eight-tenths, eleven had dams that tested three and three-tenths, etc.

You will notice through this table a zigzag line running down, and you will see that if you carry it out just in above the zigzag line it is divided into corresponding parts. That line, in other words, separates the table into two groups. All below and to the left represents animals that tested lower than their dams, and all that part of the table above and to the right of the zigzag line represents animals which tested either the same or higher than their dams did. Now you will see that, ignoring a few scattered individuals, that the great mass of figures takes an oval shape, and the zigzag line runs through this oval a little to the low side. That is to say, there are rather more individuals above and to the right of the zigzag line than below, indicating, if it indicates anything, that there is a tendency for the daughters to have milk somewhat richer than their dams. As I say, while we have not figured out the exact correlation, we have arranged the result of these figures into a little table which is shown in the lower left-hand corner of the larger table printed above. Those figures represent just what has occurred. Of the 1,449 cows a little more than a thousand fall into the group between three and one-tenth and three and nine-tenths per cent., which is the common percentage of fat in milk of this breed. All that tested

below three, or above four may be not exactly abnormal, but beyond the average of the breed. Now taking the cows, the dams that tested below three per cent., and we will find that they had 221 daughters. Of those 221 daughters, 208 tested more than the dams did, and only thirteen tested less. That is to say, if you take a cow that gives an abnormally low percentage in her milk, the chances are ninety-four per cent. that ninety-four of her daughters out of a hundred will test more than she did, the percentage being ninety-four and one-tenth that will test greater, and five and nine-tenths that will test less. Now if you take the cows that represent the mean of the breed, including the great mass, or one thousand out of the 1,400, and we find that out of 1,034 daughters 601 tested more than their dams did, who had a larger percentage of fat, and 434 had less, the percentage being fifty-eight and one-tenth on one side and forty-one and nine-tenth on the other, or those which tested less.

Now of the cows that went above four per cent. Of these there were 193 cows — daughters. Twenty-seven of them tested more than their dams did and 166 tested less, or fourteen per cent. tested better than their mothers and eighty-six per cent. poorer than their mothers. Now this, it seems to me, shows a strong thing in reference to the transmission of qualities from parent to offspring. We say, and most every one commonly accepts the idea, that like produces like. We have accepted that without question ever since we began to give attention to improving methods, but, as a matter of fact, like does not produce like. Like produces likeness of type, but the constant tendency of an individual or in a breed is to bunch them together in the middle. If we select from those that are away up at this point, the tendency of the offspring is in this direction, or toward the middle. On the other hand, if we select from these that are clear over here, the tendency of their offspring is to go in this direction; or, to put it in another way, there is a tendency in the transmission towards a common center as the standard type of the breed.

Now is there a practical lesson that we can draw from this? I think there is one, and that is a small one. You may say that we have gone to a great deal of trouble to make all these figures, but you will easily recognize that these figures were not assembled in anywhere near the time that it has taken me to talk

about them. You may say that we have gone to a large amount of trouble and labor to prove a very small thing. Well, let us see. The practical result or lesson that I want to draw from this talk to you this morning would be briefly this: if you want to improve the percentage of fat in the milk of your cows, it is not the cow that is giving the richest milk that is the best one to breed from, but the cow that is giving a milk somewhat above the average, as shown in this group indicated in the last table. Cows that have given three and four-tenths and three and nine-tenths per cent. of fat will have a larger percentage of daughters showing an increase. There is another reason for this. If we confine our selection to cows of that class, we will naturally have a comparatively few to choose from, and the failures being enormous, we shall not make progress in numbers very rapidly. If we select from cows further up the line here, having percentages slightly above the average, we shall have a greater number to choose from, and the percentage of failures will not be so great; whereas if we go still to the far extreme of cows that give a small percentage of fat in the milk, why, we will get an increase in the daughters, but the increase will not be sufficient to improve the mass of the breed. It is only when we get above three and one-half per cent. in this breed that we are making any marked improvement.

I do not know whether I have made myself clear along this line. I do not know whether many of you are interested, but if there is anything further I will be glad to answer any questions, if I can. Like the others that preceded me, I shall not hesitate to say no if you ask questions that I cannot answer.

The PRESIDENT. Now are there any questions to ask Professor Wing?

QUESTION. You have taken in your talk for your type the Holstein cow. Now if you took the Jersey, wouldn't your figures apply just the same?

Professor WING. I think so.

QUESTION. Another thing. None of our men need to feel disappointed if they cannot get up to the point that has been made by some animal that has made an enormous record. There are lots of good cows that you can get along well with. Therefore, as I understand you, Professor, you would not advice every

farmer to pay a thousand dollars for one or more great dams with the idea of running the risk of producing great daughters?

Professor WING. Not at all. If you make your selections from cows which are something above the average of the breed, if you will keep just a little above the average, you will make progress definitely, and you will not have to put that amount of money into it.

QUESTION. Do you think it makes a difference what we feed a cow in order to bring her up?

Professor WING. So far as the percentage of butter fat, no, but that, of course, would be complicated by the environment which the cow is surrounded by, all of which things enter into the amount of milk.

QUESTION. You take no account in this estimate of the sire.

Professor WING. No, we have no means of studying the sire. Undoubtedly the sire had an influence in every case, but we may assume that the influence of the sire was just as great in one case as it was in another, but taking so many as 1,449 cows, the number that is shown on the chart, I think we may eliminate the influence of the sire. That is to say, it has been equalized. There has been as many where there has been improvement from the sire as there has been where there has been retrogression.

The PRESIDENT. I would like to ask you, Professor, if you were breeding for good producing cows, whether you would not prefer to breed from a cow with a fairly good record or from one that stood the test of feeding for an advanced registry; in other words, whether you would feel that you could get a better cow out of a fairly good producing cow or from one of these large producing cows which, according to your statement, are not able to transmit those qualities as well as a cow of a lower productive power. You very seldom hear of a very fast horse that has been produced by a very fast mare that has been raced for some years. There are some few but they are very scarce. I would like to know what your views are about that, so as to get it on the record. I think I understand your position, but I would like to get it on the record.

Professor WING. A couple of horsemen fought that out, if I remember correctly, and the final decision was that the making of a record was an advantage in the transmission of speed in

the horse, but when you say, as you do, when you press it to the extreme limit, it does not prove anything when it comes to the breed whether they do or do not. Now take these animals represented in the table. Those that represent the normal of the breed, or a little above the line, I should say that we would expect that their development will improve the development of their offspring. To answer your question, perhaps in a little more direct way, I should prefer to breed from animals that had been developed to the full capacity of their power, but that does not necessarily mean animals of the highest productive power.

PRESIDENT LEE. I am glad that point has been brought up. There is a feeling among some of our men that it hurts a cow to feed her too heavy in order to make these advanced registry tests. I am glad that this matter has come up; as to whether it is safe to force a cow or not, my answer has been always that if you give a cow indigestion, and perhaps ruin her health, it was a good deal worse to run that risk than to let her take her course, to feed her naturally, so that she would produce the best that she was able, and always take her feed. In other words, not to force her beyond all reasonable limits, because in doing that you have done harm rather than good. Would you hold to that same opinion?

PROFESSOR WING. Yes, I would. I have made this statement a great many times, when this question has come up; that of all the cows that have been injured, not only for breeding or for any other purpose, that every cow that has been injured is represented by ten cows that never had enough to eat. I have never had that position controverted. You are all good feeders in Connecticut, but I think it is perfectly safe to say that there are very few cows indeed that suffer from over-feeding. A great many cows would be better cows if their owners were better men, or if their owners had the nerve to give good feed to a good cow.

QUESTION. Professor, isn't your argument somewhat in conflict with what we have been taught, that the sire was more than half of the herd?

PROFESSOR WING. I do not think that that statement has ever been made in that way, meaning by that, that the influence of the sire in any particular case was greater than the influence of the dam. The sire is only more than half of the herd because

he is the sire of all of the offspring, and the dam is only the dam of a comparatively small number. In that sense, the influence of the sire is large. Suppose you have a herd of forty cows, and you do not have but one sire. Each particular cow has an influence only upon her own calf, but in any particular sense he is not more than half. He is exactly the half. In any individual case the offspring may more clearly resemble either parent, and if you take a sufficient number of cases, a thousand or two thousand or ten thousand, we recognize that the influence of both parents is equal in the offspring. The larger the number of cases we include the more nearly exactly are they mathematically the same.

QUESTION. Will that also hold true as to pure breds or the grade?

Professor WING. Yes, it will hold true as to everything.

QUESTION. Mr. Lee spoke about a fast trotting horse not having come from a fast trotting mare. It seems to me that one reason for that might be found in the fact that the fast trotting mares were reserved for the track, and were not bred nearly as much as others; that there was danger of injuring them for trotting purposes if they were made to raise colts. I think that accounts for the fact that that class of horses do not have nearly as many colts as perhaps we would expect. I hardly think it has been shown that horses of that class will not produce fast colts, but it rather shows that they have not had the opportunity.

The PRESIDENT. We have been particularly fortunate during this convention, and this discussion, it seems to me, has been of great interest. Now I have another thing to announce which I think will prove of interest to you. The Secretary informs me that Mr. Patten of the Board has the premium list on corn to announce. I would like to ask Mr. Patten to step forward and read those premiums. You all want to know who has won them.

Mr. D. W. PATTEN. Mr. President and Gentlemen: I have taken off these lists hurriedly, and I would say for the convenience of those who take the New Haven papers that these awards will be published in the *Register* and in the *Evening Leader*.

PREMIUMS ON CORN OFFERED BY THE CONNECTICUT
STATE BOARD OF AGRICULTURE.

CLASS A., DIV. 1.

- 1st. Jacob Voorhis, Greenwich, Conn.
- 2d. Dennis Fenn, Milford, Conn.
- 3d. A. G. Gulley, Storrs, Conn.

CLASS A., DIV. 2.

- 1st. John B. Hubbard, Guilford, Conn.
- 2d. Walter L. Yale, Meriden, Conn.
- 3d. Elizabeth Anderson, Greenwich, Conn.

CLASS A., DIV. 3.

- 1st. Phelps Montgomery, New Haven, Conn.
- 2d. Oliver D. Mead, Greenwich, Conn.
- 3d.

CLASS D., DIV. 4.

- 1st. Frederick Sturgis, Fairfield, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. H. I. Nettleton, Durham, Conn.

CLASS B., DIV. 1.

- 1st. E. E. Burwell, New Haven, Conn.
- 2d. Harrison L. Hamilton, Ellington, Conn.
- 3d. Louis C. Edwards, Ellington, Conn.

CLASS B., DIV. 2.

- 1st. Frederick Sturgis, Fairfield, Conn.
- 2d. William A. Murray, Fairfield, Conn.
- 3d. Frederick Sturgis, Fairfield, Conn.

CLASS B., DIV. 3.

- 1st. No. 1922.
- 2d. W. P. Johnson, Columbia, Conn.
- 3d. Walter E. Price, Warehouse Point, Conn.

CLASS B., DIV. 4.

- 1st. Sullivan Pine, Portchester, N. Y.
- 2d. Silas E. Mead, Greenwich, Conn.
- 3d. J. E. Watson, Marbledale, Conn.

CLASS C.

- 1st. Dennis Fenn, Milford, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. Seaman Mead, Greenwich, Conn.

CLASS D.

- 1st. Edward G. Haynes, Suffield, Conn.
- 2d. Edward G. Haynes, Suffield, Conn.
- 3d. Charles Schwab, Yalesville, Conn.

CLASS E.

- 1st. Robert D. Chapman, Westbrook, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. Robert D. Chapman, Westbrook, Conn.

CLASS F.

John B. Hubbard, Guilford, Conn.

CLASS G.

J. E. Watson, Marbledale, Conn.

The PRESIDENT. We have been fortunate during this convention in being able to draw not only upon our own Agricultural College but upon colleges from a neighboring state. For the second time this morning we draw upon my native state of which I am so proud, and we are now to have a speaker from Amherst Agricultural College. His subject is one that I am sure, if you had been over that farm as I have been over it, that they had solved the problem of which he is going to speak very well indeed. When I went over the farm at Amherst I could see those beautiful fields, and I was very much impressed. They had their troubles in their early days, but a good friend of mine who loves farming as we all love it happened to be one of their trustees, and I think the Professor will bear me out in saying that he has been able to accomplish more for that college than any man ever accomplished for it. It gives me great pleasure to introduce to you Professor William D. Hurd of Amherst, Mass., who will address you on the subject of "The Nitrogen Problem in the Dairy."

Professor HURD. Mr. President and Ladies and Gentlemen: If I had read the program of this meeting before I prepared the paper or address which I have in mind to give you, I might have prepared, perhaps, a little different sort of a paper, but I shall not offer an apology for, perhaps, reading some things that might have been changed. Some of the things which I shall, perhaps, say in the course of my talk may have already been touched upon, but it perhaps, does no harm to have some of these things reiterated, so if I do repeat it will be simply because I feel strongly on this subject.

There is no subject of greater importance to a farmer at present, or that will be of more increasing importance in the future, than the problem of securing nitrogen. This question is an especially serious one in its relation to animal feeding. In our fertilizers too, when we stop to ask ourselves where the nitrogen of the future is to come from, we are forced to pause for serious reflection; and I take it that no more important subject could be discussed in all its phases before any New England audience interested in agriculture, than this one.

This whole subject of the nitrogen supply of the future is one far too broad to be treated in the time allotted me for this paper, so I must confine what I have to say to one line particularly, and have chosen the part nitrogen plays in economical dairy management in New England.

Nitrogen is the great stimulating element essential to plant and animal life. It is as necessary to your life and mine, and to the plants and animals about us, as the water we drink or the oxygen we breath. It, with other things, forms protein,—the flesh forming feed, the material required for building up the tissues of the body, and for maintaining these under the wear caused by the vital functions.

In the past hundred years, its existence, the various forms in which it is found, and the part it plays in the organic life of the world, has furnished a problem ever presenting something new to scientists. The end of this study is not yet, although the past twenty years have given perhaps more definite knowledge of this subject than all the years that have gone before. With potash, phosphoric acid, and lime, it ranks among the elements of foremost importance in agriculture. Unlike either of the other three, it is the most elusive, appears in more varied forms, is most easily lost, and at the same time is the most abundant of these four important elements of plant and animal life. Upon the proper handling, conserving and maintaining of this element, nitrogen, depends the future fertility of the soil and the ability of the land to produce food and raiment, to supply all the needs,—yes, even the luxuries of civilized nations.

The last fifty years have witnessed the greatest progress in the advancement of agricultural science. Liebig, Boussigault, Lawes and Gilbert and others, through their application of well known laws of chemistry and physics to this science, have brought agriculture to a stage where it ranks first among the arts, and is second to none of the professions. These men and those now working in laboratories all over this and other countries, have turned men's thoughts to the soil and its possibilities, and have indeed opened up a "New Earth" to inquiring minds. We have been taught new systems of husbandry, new methods and new ideas have been given us. Among these, the part nitrogen plays is not the least. In this new agriculture we have been turning our attention to the proper forms of human food to use, the proper form of fertilizers to buy in an effort to increase our crop production, and the balanced ration as applied to the feeding of our domestic animals. The first two of these are not to be discussed in this paper; but the latter,—the part nitrogen plays in the activities of the dairy farmer,—is the thing to which I especially desire to call your attention at this time.

The hold that the consideration of the nitrogen problem has taken on the world at large caused a prominent writer to say a

short time ago that we are "Nitrogen mad." Whether this statement be true is perhaps an open question, but nevertheless it is of paramount importance at the present time.

When I first came to the neighboring state of Maine seven years ago, I made the contention that a more successful, profitable, and economic system of dairy management could be developed in that state, if the farmers, instead of depending so much on high priced concentrated feeds, would raise more roughage and turn this into the finished products of milk, butter, or cheese. Each year's experience has strengthened me in this belief, and it was with much pleasure that I noticed at the state Dairymen's Association in Maine last week, that there was much more interest in the subject of producing feeds on the farm than in past years. It has seemed to me that there were a number of crops, many of them decidedly rich in protein, that could be raised in New England to take place of, in a way, much of the feed brought from the west; and to the end that I might satisfy myself as to what the conditions were under which our good old red clover could be produced, I experimented to quite an extent with this crop in handling the college farm at the University of Maine, with a view to producing all the feed possible for a good sized dairy herd in that state. Minor details of culture may vary with different conditions, but I believe the general principles which I shall outline in this paper will be found to be as true in Connecticut as they were in Maine.

There are perhaps three phases of the nitrogen problem in its relation to the dairy, which might be discussed in a paper of this length.

1. The character and quality of the feeds rich in protein which are shipped into New England in such large quantities.
2. The waste and losses of nitrogen due to the careless management of the manure produced by the dairy herd.
3. The crops rich in nitrogen that can be grown on the New England farm, and the uses the dairyman should make of them.

I do not care to discuss at this time the subject of concentrated feeds in any but the briefest sort of way. A few years ago we heard a great deal more about the balanced ration than we hear today. Agricultural chemists and animal feeders are far more careful in their statements regarding balanced rations than they were ten, or even five years ago. I believe that it is highly desirable to purchase a certain amount of these feeds rich in nitrogen to bring the ration up to an approved standard, but I do not believe that the concentrated feed should be made the

basis of the ration. In buying these feeds, do not do this indiscriminately. You must consider that protein is not of equal value pound for pound in these feeds; that the digestibility, hence the feeding value, varies in the different feeds; and that there is usually a fluctuation in the market prices which may make feed which is highly economical to purchase one month, a decidedly unprofitable feed to buy the next month. The successes of the cow testing associations in Maine, Vermont and some of the other states, are revealing startling things on the value of different feeds in dairy production, and if I were to discuss this matter of concentrated feeds at greater length I could but plead for a careful study of the different feeds and more careful and thoughtful business judgment in the purchasing of them.

2. *The losses of nitrogen from stable manure.*

Nothing perhaps impresses itself on one as he travels over this country so much as the fact that there are very great losses from the manure heap occurring on every farm. It is of course impossible to prevent all loss from this source, but either farmers do not realize the value of manure, or else they are careless in this direction. I know of men in the states where I have lived who allow the drainage from stable manure to run down the barnyard across the road, and we often see the rich dark colored liquid finding its way into the waters of nearby streams and rivers. Inquiry on my part has brought out the fact that these same people usually attempt to replace this nitrogen costing eighteen cents per pound, potash costing four and one-half cents and phosphoric acid costing five cents, the following spring by purchasing commercial fertilizer. It is needless to comment further on this point as a business proposition.

Losses from stable manure occur chiefly in three ways:

1. Loss of the liquid portions through the stable floors.
2. By heating or fermentation.
3. By allowing rains or melting snows to leach and carry the fertilizing elements away after the manure has been removed from the stable. It will be apparent that anything done to lessen losses in either of these directions is so much saved in dollars and cents.

The following table has been prepared to show the value of the manure produced by twenty dairy cows, when fed on the ration stated, for a period of six months:

Estimate of the value of the manure produced by twenty cows, fed on the ration given below for six months.

Kind of Feed Daily ration	Nitrogen lbs.	Potash lbs.	Phosphoric Acid lbs.
30 lbs. Corn silage,	0.108	0.099	0.042
12 " Clover hay,	0.240	0.264	0.052
1 " Cottonseed meal,	0.065	0.018	0.027
3 " Bran,	0.086	0.048	0.084
1 " Linseed Meal,	0.054	0.011	0.014
1 " Corn meal,	0.020	0.004	0.007
	<hr/>	<hr/>	<hr/>
Amt. of fertilizing elements per day in feed,	0.573	0.444	0.226
About 75% of fertilizing elements in feed are left in manure,	75%	75%	75%
	<hr/>	<hr/>	<hr/>
	0.429	0.333	0.168
Multiply by twenty cows,	20	20	20
	<hr/>	<hr/>	<hr/>
Pounds produced by twenty cows in one day,	8.58	6.66	3.36
Multiply by 180 days (six months),	180	180	180
	<hr/>	<hr/>	<hr/>
	1544.0	1198.0	604.0
1544 lbs. Nitrogen at 18c. per lb.,			\$277.92
1198 " Potash at 4½c. per lb.,			53.91
604 " Phosphoric acid at 5c. per lb.,			30.21
			<hr/>
Value of manure of above twenty cows for six months,			\$362.04

Too much emphasis cannot be laid on saving the liquid portions of the excrement. This liquid portion contains about eighty per cent. of all the nitrogen, and about sixty-six and two-thirds per cent. of all the potash contained in the manure. Further than this these elements are already in a soluble form, and are the more readily lost. If this escapes through leaky stable floors, or by improper storing, very little is left beside the strawy matter and some phosphoric acid. It, then, is clear that a tight stable floor is the first requisite to prevent this waste; and secondly,

some absorbant, it matters not what, should be kept on this floor to at once take up the liquid portion before it is lost. Straw is of course best, since it aids materially in improving the physical condition when applied to the land, and at the same time has had some fertilizing value; but in the absence of straw use leaves, sawdust or shavings, rather than lose the most valuable portion of the excrement. While sawdust probably has no actual benefit on the land, it at the same time, in the quantities generally used, does no particular harm, and should be used every time in preference to nothing as an absorbant. These latter two are most popular where the attempt is being made to produce certified milk.

A few years ago the matter of chemical absorbants received much attention. We are not hearing so much about them at the present time, but experiments have shown that Gypsum (land plaster), (never ordinary lime), Kainit, or other potash fertilizers and acid phosphate, all help keep the stable sweet, and when sprinkled in the stable each day, or over the manure pile, help to prevent fermentation and of course add that much to the value of the manure, provided it is properly cared for in the pile.

The matter of how the manure is stored after removal from the stable is important in the prevention of losses. A manure cellar is expensive to build, and try as hard as we will there are odors always finding their way into the stable. With the attention that is now being paid to clean milk, the manure cellar must go. The cheapest and most approved plan now is to have a cheap shed attached, or detached, to the stable, into which the manure is wheeled or carted and stored. The more flat and compact the pile is kept, the less fermentation there will be. When the odor of ammonia is noticeable, you may know that there is considerable nitrogen worth eighteen cents a pound passing off into space. In constructing the bottom of the shed, scoop it out so that it is slightly concave, and be sure that no drainage from the pile runs off down the hillside. It often becomes necessary to remove a part of the manure from the cellar or shed during the winter, to make room for more that is being produced. In making the compost heap in the field, observe the same precautions. Do not build the pile on a hillside, but rather where the ground slopes towards the center, and make the pile compact and keep it flat on the top.

The best method of applying in the field is a matter which usually causes considerable discussion. The three common ways

are to draw daily from the stable and spread on the land; to pile in small heaps and let these remain for some length of time; and to draw spring and fall from the pile and apply to land plowed or to be plowed in the future. Deep snows in some parts of New England, and steep hillsides, make the first method often inadvisable. The small pile method should never be used. This small pile of two or three bushels offers the best opportunity imaginable for leaching, heating and fermentation. We have, then, the third way left as the only alternative. Whenever possible it is advisable to get the manure into the soil either by plowing or harrowing as soon as possible. The soil has certain powers of fixing nitrogen to a slight degree, and potash and phosphoric acid to a greater extent, hence loss is prevented. The practice of allowing a covering of valuable stable manure to remain on sod land especially during variations in temperature, and when the ground beneath is frozen, is a questionable practice, and should be avoided whenever possible. Besides the loss of plant food, the strawy matter valuable later to form humus, is often blown away and lost. A manure spreader is one of the greatest time and money savers on the farm, to say nothing of its ability to spread the manure more evenly and break it up finer. An experiment tried a couple of years ago on the college farm showed that a man and team could haul out and spread one-third more manure with a manure spreader than with a cart in a day's time.

3. *The crops that can be raised in New England to supply nitrogen.*

This subject should rightly be discussed from two standpoints: namely, the fact that the growing of crops which have the power, through certain bacteria, of extracting nitrogen from the atmosphere, are of inestimable value in building up soils which have been depleted of their fertility; and secondly, from the standpoint of substituting home produced protein in place of that in feeds that must be purchased.

You in Connecticut are buying hundreds of pounds of feeds rich in protein,—a term used by chemists to cover all albuminous materials;—nitrogen included (six and one-fourth parts of the protein is nitrogen) in cattle feeds; and large amounts of nitrogen in commercial fertilizers; and at the same time you are allowing hundreds of pounds of the material to be lost each year and are not taking advantage of the inexhaustible supply of this most costly element—nitrogen—which comprises about seventy-five per cent. of the atmosphere. Nitrogen is costing, when bought

in the market, eighteen cents per pound, phosphoric acid only about five cents, potash about four and one-half cents and lime about four-tenths of a cent per pound. Nitrogen being the most easily lost of these elements, should receive the more careful consideration.

Dairy farming comes nearest being the safest kind of husbandry, because in live stock production we should aim to raise a large amount of feed, and use this through our animals for the production of finished products, returning a large amount of fertility back to the land in the shape of manure. There are those who will tell you that the absence of live stock is one of the fundamental causes which has led up to the "run down" condition of much land in New England.

The Minnesota Experiment Station has worked out the losses in fertilizing elements in different systems of farming. On a farm of one hundred and sixty acres there might be sold in a year, when different systems are practiced, the following amounts of nitrogen, potash and phosphoric acid:

System of Farming	Nitrogen lbs.	Potash lbs.	Phosphoric Acid lbs.
All grain,	5,600	4,020	2,460
Mixed grain and general,	2,594	1,047	1,003
Potato and general,	2,363	2,435	991
Stock raising,	898	59	35
Dairy farming,	809	85	76

These figures show clearly that dairy and stock farming carry less away from the farm than the other systems. If, in the case of dairy farming, only butter is sold and the skim milk is kept on the farm and fed to young stock, there is only a very small amount of fertility lost, and this is made up many times in the feeds that are usually purchased and the manure that is returned to the land.

While it is well that we understand these facts, it is not enough that we should be satisfied with a fair condition of things; but should, when we know certain losses are occurring, strive to correct them.

While we are discussing nitrogen principally, yet corn should never be left out of any discussion of dairy feeding. More feed can be secured from an acre of corn than any other crop. Silage and the silo are almost indispensable to successful feeding. Most of you will no doubt agree that complaints against corn in this form can usually be traced back to improperly cut, improperly

stored, or improperly fed silage. When corn could be laid down at the railroad stations of New England at from twenty-nine to thirty cents a bushel, there might have been some excuse, for you even in Connecticut which has proven itself to be the greatest corn state in this country (yield per acre considered), for not growing corn. But with the price ranging from seventy cents to ninety cents, as it has during the past ten years, there is every reason why corn growing should be taken up with renewed vigor; and I am extremely glad to see so much attention being paid to "better corn for New England" at this meeting.

Among the list of leguminous crops which can be grown profitably in this State for dairy feeding, are the different clovers, peas, vetches, soy beans, cow-peas, and we hope in the near future alfalfa.

The following table shows the average analysis of our common farm crops. It offers a chance to compare them from their dairy feeding value standpoint.

FEEDING VALUE OF COMMON FARM CROPS.

Name of Feed	Dry matter in 100 lbs.	DIGESTIBLE NUTRIENTS IN 100 LBS.		
		Protein Per cent.	Carbo- hydrates Per cent.	Crude Fat Percent.
Corn (silage),	20.9	0.9	11.3	0.7
Corn Fodder (dry),	57.8	2.5	34.6	1.2
Red Clover (hay),	84.7	6.8	35.8	1.7
Alfalfa (hay),	91.6	11.0	39.6	1.2
Barley (hay),	85.2	6.2	46.6	1.5
Cow Pea (hay),	89.3	10.8	38.6	1.1
Millet (hay),	92.3	4.5	51.7	1.3
Oat (hay),	91.1	4.3	46.4	1.5
Oat and Pea (hay),	85.4	9.2	36.8	1.2
Mixed Grasses and Clovers,	85.3	4.8	39.6	1.6
Timothy,	86.8	2.8	43.4	1.4
Vetch,	88.7	12.9	47.5	1.4
Mangels,	9.1	1.1	5.4	0.1
Rutabagas,	11.4	1.0	8.1	0.2
GRAINS —				
Corn,	89.1	7.9	66.7	4.3
Barley,	89.1	8.7	65.6	1.6
Oats,	89.0	9.2	47.3	4.2
Peas,	89.5	16.8	51.8	0.7
Rye,	88.4	9.9	67.6	1.1

The difference in the analyses of clover and timothy hay, the richer manure obtained from the feeding of clover, and the difference in price of the two kinds of hay would go to show that it would be a very profitable venture for a dairy farmer to sell his timothy hay at eighteen to twenty dollars, or even a higher price than this, and buy back at ten or twelve dollars a ton good clover hay.

It seems to me that this side of the question,— the growing of leguminous crops on the farm is the most important phase of the whole matter.

The failures that have been recorded in attempts to grow clover are due largely to a poor understanding of what the conditions for its growth should be, and attempts have been made to produce it under conditions entirely unsuited to its growth. We have passed through that wave of excitement when we were told that soil inoculation was the one salvation for run down lands. We are now ready to say, that given the proper conditions so that the clover plant can thrive, the bacteria will increase in a like proportion. In answer to the statement so often heard that one cannot produce feed so cheaply as it can be purchased, I submit the following statement of expenses of growing an acre of clover through three years under our existing conditions at Orono, Maine, under the method while I had charge of the college farm. I realize that the cost of operations under different conditions vary, so I have tried to make this up for an average season, and I think I have estimated the different operations liberally. The soil of the college farm is a cold, wet clay, and one which would not be considered as at all suited to the growth of this plant.

The table, you will notice, covers a period of three years from the time the clover seed is sown until the hay crops of two succeeding years have been removed. The field has been debited and credited with the items which properly belong to it. Time of man and team has been calculated at thirty-five cents per hour, and of men alone fifteen cents per hour. I think you will see that the figures show a sum decidedly in favor of growing clover if only the financial side was considered. What, then, are the conditions most favorable to the growth of this crop.

First, a well drained soil. Naturally clover roots penetrate to a depth of several feet, and when standing water is encountered by them, they stop, "dam off," and go no further. A good deal of the value in growing clover comes from the fact that the roots do go down deeply in the soil, and again bring up plant food which has passed beyond the reach of shallow rooted crops. In a poorly drained soil the clover will grow for a time but it usually kills out before the second season,— the year when the largest crop should be expected. The water table should be at least three and one-half feet below the surface, and when it is not, tile drains should be put in before clover introduction is attempted.

COST OF GROWING CLOVER HAY
FOR THREE YEARS

Per Acre

RETURNS FROM CLOVER HAY FIELD
FOR THREE YEARS

Per Acre

1st year

Plowing and fitting land,	\$ 4.00
Cost of clover and grass seed, and labor of seeding,	3.25
Cost of 2½ bu. seed oats @ 75¢,	1.88
Cost of seeding down fertilizer 350 lb. and labor,	5.60
Harvesting and threshing 50 bu. oats,	4.25

2d year

Cost of chemical top dressing 2d spring,	5.95
Cost of cutting and handling 3 tons hay, 1st crop @ \$2,	6.00
Cost of chemical top dressing for 2d crop,	5.95
Cost of handling 2 tons, 2d crop, @ \$2,	4.00

3d year

Cost of chemical top dressing 3d season, 1st crop,	5.95
Cost of cutting and handling 3½ tons hay, 3d season,	6.66
Rent of land (valued at \$50 per acre allowing 5% for 3 years),	9.50

\$62.99*1st year*

50 bu. oats @ 50¢,	\$25.00
2400 lbs. straw @ \$8,	9.60

2d year

3 tons hay, 1st crop @ \$12,	36.00
2 tons hay, 2d crop @ \$12,	24.00

3d year

3½ tons hay at \$12,	40.00
(No 2d crop that season.)	

\$134.60

It should be noted that the above amounts of hay fed to stock would give manure/having a fertilizing value of about \$58.00.

Besides this in clover growing the fertilizing value of the top and roots would amount to \$20.00.

All these things should be taken into consideration in practical husbandry.

If the latter two items were entered, \$58, \$20,

78.00

\$212.60

Secondly: Some crops will grow fairly well in a soil quite depleted of its available plant food, but clover demands a soil in a fairly good state of fertility before good crops can be expected. It is sometimes necessary to grow and turn under, rye, buckwheat, or some other crop in order to improve the land before clover can be grown.

Thirdly: Clover is a lime loving plant and does not grow and thrive for any length of time in an "acid" or "sour" soil. When this condition exists an application of lime in amounts of fifteen hundred pounds to two thousand pounds to the acre should be applied. Soils, even though they do not show the acidity test by the usual methods, are often greatly benefited by the application of eight hundred pounds or one thousand pounds

of lime at the time of plowing the land, when it is the intention to grow clover upon it.

This matter of "water logged" soil and an "acid" soil are directly concerned with the helpful action of the nitrifying bacteria. If we are to get the benefit of having these organisms take from the air and store in the soil and in the roots of this crop, nitrogen amounting to several hundred pounds to the acre, we must correct both of these conditions, for the process of nitrification will not go freely on, and the bacteria will not multiply to any great extent when either condition is present.

Fourth: We should look carefully to the kind and quality of the clover seeds we buy. When a sample of seed will show a germination test of only seventy-five per cent, it means that one quarter more seed must be used. In our climate, where occasionally the conditions are such that clover winter kills, it is advisable to use a mixture of clover and grasses. One that gave us the best of satisfaction, was:

Per acre	{	11 lbs. Timothy,
		6 " Red clover,
		1 " Alsike clover,
		4 " Kentucky bluegrass or red top.

The wisdom of using this mixture was shown two years ago when our clover killed out. The next season the timothy and bluegrass came on and gave us a yield of three and one-third tons of hay to the acre.

Fifth: The fertilizer for clover. Clover has the power and we expect it to skirmish around for a part of its nitrogen, hence fertilizers used on clover sod should not contain high percentages of this element. Clover demands potash in liberal amounts, therefore the advisability of using this element quite freely. For several years we used each spring the following top dressing of chemicals on our clover sod and other grass lands.

240 lbs. Nitrate of soda,	{	Applied from three to four acres.
360 " Muriate potash,		
600 " Acid phosphate.		

Later experiments showed that sulphate of potash was a better source of this element than muriate.

Director Brooks of the Massachusetts Experiment Station strongly advises the using of the mineral elements in great abundance, in order not to lessen the chances of the clover crop taking large amounts of nitrogen from the air.

These materials are mixed together and applied broadcast at the rate of three hundred pounds to the acre, early in the spring. They are all soluble and are quick in their action.

For the reasons spoken of in the earlier part of this paper, I do not advise the use of stable manure as a top dressing on grass and clover sod.

Sixth: The time of cutting and method of curing clover determines the nitrogen content in the hay, and also the duration of the clover plant in the land. Cut in full bloom as compared with that cut out at a later stage, the differences of composition are as follows:

1. The crop contains less woody fiber when in full bloom.
2. The crop contains its maximum amount of protein when in full bloom.
3. The nutrients in the crop are more evenly distributed.
4. The crop contains its maximum amount of essential oils which impart palatability to the feed.
5. The hay is of a brighter color, more succulent, and is relished better by stock than hay cut at a later period.

Plants when they have produced seed, die, their cycle of life has been completed. When cut in the bloom and before any seeds are produced, the roots will produce another set of stems and leaf, hence more than one crop is secured and the life of the plant in the soil is lengthened out.

Seventh: There is still another thing in clover production which must not be overlooked, and that is good tillage, proper preparation of the land, and an occasional rotation of crops. If bacteria are to take nitrogen from the air, we must devise means of promoting soil ventilation. The plow and harrow are the chief means at our disposal of aiding in this matter, and we should make good use of them.

I am sorry that I was not present last night to hear what the two gentlemen said about alfalfa growing for Connecticut.

Every one, I am sure, is desirous of seeing alfalfa being grown successfully in New England. As shown by the table giving the analysis of the different farm crops, it is considerably richer in protein than clover; and if it could be grown it would be the "salvation of the dairyman." Alfalfa is a perennial, that is, lives for several years when once seeded. A field should be at its best when five or six years old, and should continue to produce good crops for at least ten or fifteen years. The most of the alfalfa fields in New England which I have seen, gradually lose their producing power, and have a tendency to die out after the

second year. Until we can overcome this tendency, we cannot really say that we are growing this crop successfully.

In alfalfa growing, all of the conditions I have mentioned as being essential to clover growing, must be present. And some of them must be even more carefully looked after. Good alfalfa land must be well drained. It does not make much difference what the top soil is, but the sub-soil must be porous. Alfalfa land must be free from weeds at seeding time. This crop cannot fight for a start with weeds. The seed must be virile. Much poor alfalfa seed has been offered in eastern markets. The alfalfa when once started must be cut whenever any of it begins to bloom, whether the yield be five hundred pounds or five thousand pounds to the acre, if the strength of the field is to be maintained.

Perhaps a great advance could be made if some individual or experiment station would start seeds from some of the alfalfa plants which are growing wild in nearly every region, and by a series of careful selection, develop a strain adapted to New England conditions. Many of the best agriculturists of the east have given alfalfa the best possible conditions, but there seems to be some local conditions under which this crop does not succeed.

It does not seem to me that alfalfa for New England has yet passed the experimental stage, and so is not to be considered by the average farmer very seriously. Until some work is done toward making this most valuable crop more hardy, the mass of the farmers had better stick to the good old reliable red clover.

By referring again to the table, the high protein contents of oat and pea fodder is called to your attention. Surely this should find a more prominent place in the feeding ration of the future than it has in the past.

I have but briefly touched on these essential points in clover production, and have made no effort to explain them very minutely. The observing of these simple directions properly applied to your own farm conditions, will enable you to grow abundantly the greatest all around crop known to the world today.

As time goes on, and as we become more familiar with the forces of nature surrounding us, the coming dairyman, I believe, will be known as the "Legume Farmer," producing what he uses and taking advantage of things which a knowledge of modern agricultural science places at his disposal. By observing simple directions for caring for the stable manure, by the exercise of good business judgment in the purchase of concentrated feeding stuffs, and by the production and trapping of nitrogen in the

clover plant, dairy farming will hold its place as the safest form of husbandry, will build up these so-called "worn out" farm of New England, and will stop an everlasting, useless, and unceasing drain on what might be the most profitable line of agriculture in this State.

The PRESIDENT. Now, are there any questions to be asked of Professor Hurd? Professor, some of those figures that you gave I do not quite understand. What is your corn fodder value?

Professor HURD. As you see here, it is about two and one-half.

QUESTION. You mean as compared with timothy?

Professor HURD. Well, yes. Almost the same as timothy in protein.

QUESTION. Did you ever find any difference in your analysis of corn planted after the twenty-fifth of June and that planted before?

Professor HURD. Oh yes. There is a distinct difference in the different stages of the growth of the plant. I do not know that I have even come across that, but there is a difference in the different stages of the growth.

QUESTION. Cattle will eat all of the corn plant where it is planted late, but some of it planted earlier they will not eat, except the leaves and the husks.

Professor HURD. There is a difference, of course, in the palatability of it. The early corn, of course, matures and after a certain time loses in succulency as a food.

QUESTION. You spoke of vetch. Can vetch be grown successfully in this climate?

Professor HURD. Yes, sir. I should say that it can be, at least in northern New England. We were very successful in growing winter vetch, both for a cover crop and for other purposes.

QUESTION. What time do you sow it?

Professor HURD. We usually sow it along about the first of August. Of course, you can get it in some later than that. I think it should be sown in this latitude from the first to the tenth of June to get the best results.

QUESTION. How much seed do you put on?

Professor HURD. We sow, I think, about a bushel and a half to the acre.

QUESTION. What does your seed cost you?

Professor HURD. I have forgotten.

QUESTION. I think the seed cost about a dollar and a half. It seems to me that the sowing of winter vetch is a good proposition. I would like to ask the Professor if he knows any better proposition for a cover crop?

Professor HURD. I think red clover is the best proposition we have, for I think, from our experience, there is no place where you can grow red clover any better than right here.

A MEMBER. I had a little experience with trying to raise vetch. I sowed a piece of ground to standard vetch, it was a good piece of ground, very early, and the vetch came up, but it did not half cover it until the next spring. I took that same piece and sowed it to red clover and got three tons to the acre the next year.

A MEMBER. I have been looking at the figures on this chart. What do I find, Professor, on this chart here to encourage me to go home and build one?

Professor HURD. If you want me to answer that question I will say that I believe that you can get more milk out of silage and some root crop to help you along through these dry years. You get a very large amount of yield and it gives you a very large amount of feed on which to base a good deal of your ration. I have no hesitation in saying that I should think it would pay you to go home and build a silo.

A MEMBER. I do not see very much to encourage me.

Professor HURD. Why?

A MEMBER. Because I take this corn fodder and use it in this way. I take care of my stover. I try to take excellent care of it to make it bright and good. Then I cut it with a cutter, and throw on some hot water, and I get pretty good results in that way. Now I do not see how I am going to get any better results from your method.

Professor HURD. Well, my friend, I think you will get a better feed by taking your succulent green feed and using that — by using this green feed as a substitute for the summer green feed that you have.

A MEMBER. That is almost the same thing.

QUESTION. How would you rate the value of mangels?

Professor HURD. Mangels have a good feeding value. Of course, they are low in some of the elements of nutrition. But any form of roots of that kind is useful as food at the proper time and in the proper proportions.

The PRESIDENT. Gentlemen, one moment. I am going to call this meeting promptly to order at two o'clock, and there will be time then to ask Professor Hurd any further questions.

We are honored here today by the presence of one of the best informed, all-round men in the State of Connecticut. He is just as well informed on agriculture as he is on a great many other subjects. I refer to Professor Brewer. I want to ask you to listen to him for just about five minutes. When I was asked if I believed that Cook reached the pole I told them I hadn't any opinion, but I believed he did because Professor Brewer knows him and he says so. (Applause.)

Professor WILLIAM H. BREWER. Mr. President, I used to talk quite often before this Board, but I am out of it now from age and lack of hearing and so on. I practically have nothing to say. When I see a lot of men get together now and discuss the subjects which you have just heard in the way that it was discussed, I cannot help but feel how thankful the farmers should be that they live in this age and do not have to fight out the old battles which I had to when I first began to teach agriculture. At that time there were a great many things which could not be learned from books, and about which science could not help us, because the period of investigation was in its infancy, and we had no such store of knowledge regarding these matters as we have now. I know all of you do not recollect, and perhaps cannot appreciate as fully as I do how fully the whole matter of agriculture has been revolutionized in less than one lifetime. Agriculture, when I was a boy, was thought to depend very largely on a matter of tillage. A great many of these most important and interesting things which have been brought out in recent years were unknown. When I was a boy that began to be changed. Manure was put on as the basis of it. Very little was known as to how manures should be applied. I came here to go to the Scientific School to learn how to analyze soils, and how to raise the best crops. That movement was started here at Yale—the movement to analyze soils, to see what it needed

put into it to enable it to raise the best crops. I came here for that purpose. That is all changed now. Not that we find that the analysis of soils is useless, but we find it absolutely useless in that way for that purpose. How many years we had to labor to get the first experiment station started, and how wonderfully that movement has grown. The first experiment station in America was established in this State, and this Board, what a sight it did in aid of that movement. In that respect it did more than any other board in the United States for the establishment and upbuilding of scientific agricultural experiment stations. There is plenty of room for work now, but it lies on other lines, and on other grounds. The conditions are so different than when I began to talk to my classes on agriculture here — what I told them was a profitable way to work would ruin any farmer now. All conditions have changed. I wish I had time to go into some of those things in detail. I think it would interest you, but I shall not take up any more time. Let me just call this one fact to your attention. I did not come here until in the '60s, and I began to talk to my students along this line: you have got to have something that you can sell; you cannot compete with the west in growing corn or wheat. They can grow it very cheaply, because they have cheap land there, and therefore you should take potatoes and such things, things for which you have a market right close by. Well, I used to tell them that they could not bring potatoes from the far west. In a very few years from that time I bought in the market for my family some potatoes which I took the pains to see where they came from. I got potatoes from Minnesota and from Ireland and Norway, aside from those which were home-grown. Brought right into this market and sold in New Haven.

I thank you very much for this brief opportunity to talk to you.

The PRESIDENT. The meeting will stand adjourned until this afternoon at two o'clock.

THIRD DAY—AFTERNOON SESSION.

Music.

Convention called to order at 2.20 P. M., Vice-President Lee in the chair.

The PRESIDENT. I announced this morning that this meeting would be called promptly at two o'clock. When I took out my watch I found that I am something of a liar myself. We heard two very interesting addresses this morning. We have some men on our College staff at Storrs who know a thing or two about the cow, as many of you know who have heard them speak. Now we are to have this afternoon Professor J. M. Trueman of the Connecticut Agricultural College, who will talk to us on "The Best Method of Improving the Dairy Cow."

Professor TRUEMAN. Mr. Chairman and Gentlemen: I do not know but it is a good thing to come back home to wind up this meeting. I suppose I am to give you the first talk this afternoon as the beginning of a sort of a wind-up with our own home men. I see Professor Jenkins is on the program to follow me, and I do not know but that is a good plan. We have heard some very fine things from our friends who have come to us from other states, and if we can apply them here among ourselves it will make the meeting of some use to us. It is not always possible to get all the good from the meeting that we ought to get because we do not put in practice the things that we hear.

My subject, as the Chairman has announced, is "The Best Way to Improve the Dairy Cow." Now possibly there are several best ways. I will not attempt to say at the present time, but I am going to tell you one way I know of to improve the dairy cow, and what I want to do is to discuss, if possible, in a broad way the dairy cows of Connecticut. This is the annual meeting of the State Board of Agriculture, and I am going to confine this proposition to the cows of Connecticut. The census of 1900 showed that Connecticut at that time contained 126,434 cows on farms and 6,087 in towns and villages, making a total of 132,521. The average production of milk per cow is given as 545 gallons, or 4,695 pounds. This is a considerable increase in production over the figures given in previous census years.

Now I have prepared some figures here which show the increase from 1850 on, taking it by periods of ten years each.

Year	No. of Cows	PRODUCTION	
		Gallons	Pounds
1850.....	85,461	301	2,588
1860.....	98,877	277	2,382
1870.....	98,889	291	2,502
1880.....	116,319	325	2,795
1890.....	127,892	425	3,655
1900.....	126,434	545	4687

These figures show a considerable increase in quantity of milk given per year since 1870. I think the average production for 1900 is too high. Of course, these figures are approximate, but they show a considerable increase in the quantity of milk per year since 1870. It will be interesting to note the result for the decade ending with 1910. The figures given are only approximately correct, as very few farmers weighed the milk, and accurate figures could not be obtained by the census-takers. Now just what is the comparison of our cows with those of other states? Four states show a larger production per cow than Connecticut. They are the District of Columbia, 680 gallons; Maine, 574 gallons; Massachusetts, 572 gallons, and Rhode Island, 540 gallons. You see, taking the average that is over 800 pounds per cow more than Connecticut. That is the District of Columbia. There are more cows probably being milked now than in 1900, but I do not think there are more cows now than there were two years ago. I am of the opinion that the average production would be found not to exceed 4,500 pounds per cow, if actual weights were taken instead of estimates. If milk is valued at three and eight-tenths cents per quart, or one dollar and seventy-seven cents per hundred, the average income per cow per year for the milk is seventy-nine dollars and sixty-five cents. I have not been able yet to find anybody among the farmers that would agree to allow me to put the price of milk at four cents on the average for the whole State. Is there anyone here who knows about milk who would say that the average farmer gets four cents? We will soon have four cents, I think. There are some men who are getting it now, but when you get north of Hartford, up into Mansfield and Woodstock, you will find that the average price is quite a little below four cents. At one dollar and seventy-seven cents per hundred, the

average income is seventy-nine dollars and sixty-five cents per cow. Adding three dollars for the value of the calf and eight dollars for the value of the manure, makes the total income per cow ninety dollars and sixty-five cents. You can carry that in your minds quite easily. In my opinion, from the State of Connecticut conditions, ninety dollars per year is the greatest income from the average cow. Now let us see what it costs to keep the cow. The cost of keeping the average cow for one year is as follows; not the cost of keeping the good cow, but the cost of keeping the average cow. I have put in four tons of silage at three dollars and fifty cents a ton, fourteen dollars. One of our speakers last night said that silage was worth five dollars a ton. Silage in comparison with other feeds is not worth five dollars a ton, and it does not cost you that. The College farm at Storrs charges their department four dollars. I put the price here at three dollars and fifty cents. Then next one and one-half tons of hay, at sixteen dollars a ton, twenty-four dollars. Then I have given half a ton of grain at thirty dollars, fifteen dollars. Then I have added twelve dollars for pasture, depreciation in value eight dollars. Interest and insurance, five dollars; labor, twenty dollars; bedding, two dollars, making a total of twenty-two dollars for those items, and footing our cost of keeping the average cow for one year shows just about an even hundred dollars.

In comparison with the cost of keeping the average cow the following table shows the cost of keeping a good cow.

4½ tons of silage, @ \$3.50,.....	\$15.75
1 ton of hay,.....	16.00
1 ton of grain, \$30; pasture, \$12,.....	42.00
Depreciation in value,.....	8.00
Interest and insurance,.....	7.00
Labor, \$28; bedding, \$3,.....	31.00
	<hr/>
	\$119.75

The income from the good cow should be at least 6,500 pounds of milk per year, which, at the same price allowed for the average cow, would equal \$117.05. Adding to that the value of the calf at five dollars and the manure at ten dollars, we have a total income of \$132.05, or a net profit of twelve dollars and thirty cents, as against a net loss of nine dollars and thirty-five cents on the average cow.

QUESTION. What is the reason of selling her calf for five dollars and the other for three?

Professor TRUEMAN. I put it on this basis that every 6,500 cow ought to have a calf that is worth five dollars for any man to raise, and he takes his chances on the other one.

I am fully satisfied that these figures represent very closely the relative value of the good cows and the average cows of Connecticut. If the value of the milk is raised to two dollars per hundred, as it is at the present time, the difference in the net profit received from the two types of cows will be increased from twenty-one dollars and sixty-five cents to forty-four dollars.

QUESTION. Why do you increase the cost of labor in one case over the other? I see you have made an increase of eight dollars.

Professor TRUEMAN. Because you have got to take better care of the good cow than you have of the poor one. You have got to spend more time, and perhaps have a better man. In other words, if your cow will give you 6,500 pounds of milk you are going to take better care of her than you will of the cow that gives you only 4,500. I think one of the items between the 6,500 pounds and the 4,500 pounds is that represented by the eight dollars for the increased amount of care and labor that you put on that good cow. The bedding that I put in here at three dollars costs more, probably five dollars. I do not know as I could get out of it for five dollars, but I put it down at three dollars to be conservative, and also because in many instances there is very little cost attached to it. I am fully aware that there may be some little difference of opinion about these prices, but if you go over the list you will find that there is no very great wide differentiation from these figures. One man may have his boys do all the work before they go to school, and another man may have to put out hard cash for labor. Some of them may have boys who work for love, and in the case of a man of that kind, he does not have to figure his costs as anything. But that is not putting it on a commercial basis. I believe in putting the boys to work, and the sooner we realize the fact that we are taking more out of the herds when we make the boys do a little something about the place, the better. I believe in letting them take their part, and learn how to do it, rather than educating them away from the farm.

In order to bring clearly before us the difference it would make to the whole State if all the cows were good, or, in other words, if the average per cow were 6,500 instead of 4,500 pounds, we will multiply the total number of cows on farms first by the net loss of nine dollars and thirty-five cents, which gives a total of \$1,180,000, and means that we are selling farm crops to our cows for that much less than their market value. Multiplying the total number of cows by twelve dollars and thirty cents net profit received from the good cows we get a total of \$1,555,000, which is the increase over market price for the farm products that we have got by feeding it to our cows. If now we add the two sums together we get the difference between the average cows and the good cows, and we find that it amounts to the sum of \$2,337,000.

It is not necessary to bring to your attention any more figures to prove that there is need of a change in the average cow. The question that is of vital interest is how the change can be brought about. Undoubtedly, the first move is to weed out the very poor cows. We would naturally think that would not be necessary to say to a Connecticut Yankee, "Weed out your very poor cows." Our experience teaches us, however, that it is necessary. The number of men who are weighing the milk from their cows, and thus getting accurate information concerning their value, is remarkably small. All kinds of excuses are offered for this failure to adopt a plain commonsense business-like method of handling the herd. A man who fails to study his cows and weed out those that are really worthless should never complain of his failure to make money dairying. We need to get rid of the cows that are really poor. Of course, I have not time this afternoon to go into the method which you are going to adopt in order to do that, but many of you know what I have said before you time and time again, to the effect that you ought to weigh your milk at least often enough to know what each cow will do. The weeding out of the poor cows would reduce the total volume of milk produced, but even that might not be a bad thing for the country. The price of milk has been below the cost of production for some years, and a scarcity of supply might help to put the price where it belongs. I would not advise the farmer to worry over that phase of the subject. The milk dealer and the people will get enough to supply their wants. The weeding out

of the poorer cows, however, will cut off one source of loss to the dairyman, and his total profits will be larger from the smaller number of cows.

QUESTION. What is he going to do with those poor cows?

Professor TRUEMAN. Some of them it will pay him to put in condition and turn over to the butcher, but the trouble with that proposition is that they are not always turned over to the butcher to be put into beef. A cow, and particularly a heifer, which is turned over to a butcher may be led away to be butchered, or may be led away to be sold again, so that that does not necessarily improve conditions.

QUESTION. You mean that the butchers sell them to other farmers?

Professor TRUEMAN. Yes. They sell the cows to other farmers to improve their cattle with. You can see what the result would be if that was practiced on any large scale.

QUESTION. I know a butcher that bought some heifers and then resold them to a farmer in just that way.

Professor TRUEMAN. He got caught.

QUESTION. Don't you think, Professor, that it is a mistake to judge a cow by her first calf, or by what she does after she drops her first calf?

Professor TRUEMAN. It would be very hard for me to apply the rule rigidly. Here was a cow, suppose she made 5,000 pounds, and was a nice cow. I should feel that possibly I was making a mistake if I condemned her with her first calf, so that you understand that no arbitrary rule will apply to all conditions. As I have said, there may be places where we will practice the rule, but the idea, of course, is not to cut out stock which gives promise of doing well.

QUESTION. You cannot apply that rule as to a bull. You do not know how the bull is going to develop until he gets along.

Professor TRUEMAN. Of course, in developing a good dairy herd, you have got to have a good sire. The sire is a very important element. That has been discussed here already. I am going to take that up as I go along with my paper.

Now right along the line of weeding out these poor cows. Selection is a very important word in the farmer's dictionary. We are obliged to take what is born into the herd just as they come. We cannot definitely determine whether good or poor

calves shall be dropped, but we certainly are not obliged to raise them all to maturity, and feed them to all ages. We can select from the lot those that are profitable for us to keep. We have eyes, and we have hands, and we have brains, and we ought to use them all in selecting our dairy cows. Get rid of the poor cow, the unprofitable cow, and never mind if she is a pure-bred Jersey, with a beautiful fawn complexion and a black tongue and switch. If she is not of dairy type, and if she is not a producer, send her to the butcher. One wide-awake breeder in Connecticut has every cow that will not produce six thousand pounds with her first calf butchered on his own place. He knows then that she is not abused, and she is killed while young so that her meat is tender. Do not imagine I am hitting the Jersey breeder alone. The Holstein man will raise everything that is black and white, good, bad, and indifferent, and so with all breeds. We need to select more closely, and to set a higher standard as our ideal for dairy cows.

I know what the temptation is. If your cows have cost you a hundred dollars apiece you hate to sacrifice them. The good dairy cow is worth a hundred dollars today. But any man making milk in Connecticut today has got to select his cows with an eye to production, and if a cow is only giving him 4,500 pounds, and the figures of her keep are as I have given them and as seen on this chart, he is not making any money.

The cows that are left to us after we have disposed of the poorest ones will still be found below our 6,500 mark. The next thing to do is to improve our methods of breeding. I wish I could impress upon every breeder and keeper of cows in Connecticut, the importance of using a first-class dairy sire in his herd, a sire that has come from a long line of heavy milkers. We have not time today to discuss at length whether you shall keep your herds by buying or breeding. That is a point which every farmer has got to decide, to some extent, for himself. All I can say is this, if you are going to buy, buy good ones. Do not lead home a cow that will give you only four thousand pounds of milk, no matter what her price is. She will be a loss to you for her keep. If you get her for nothing you will still be out of pocket on her in time. She is a disgrace to you at any price, as she shows conclusively that you do not know how to conduct your own business. Pay for good ones, even though they cost

you a hundred dollars apiece. The sure way, the safe way, the healthy way, is to raise them. Do not go and pay five hundred dollars for a good cow to improve your herd. Select your good milkers and breed them to a bull that came from a five hundred dollar cow. The price that you have to pay for that bull is the stumbling block in the way of the farmer. He is not extra well supplied with ready cash, and it looks extravagant to put one hundred dollars into a bull calf, or even into a yearling, but let me assure you it is the cheapest way you can improve your herd. It is money that will bring you back the biggest returns of all you invest. Hundreds of farmers are using scrub bulls from scrub cows, while hundreds of well-bred bulls from good cows are being sold at prices far below their real worth. The two simplest ways, and the easiest way to improve the dairy cow are, first, good selection, and secondly, intelligent breeding.

Now there is another thing that I want to say. How are we going to get this thing started through the State of Connecticut? As I said when I opened my talk, one of the difficulties in our meetings was not being able to get the farmers to practice the things that we talk about. Now what good does it do a man to know how to improve a condition which confronts him unless he takes advantage of the knowledge which he has which will enable him to remedy it? Now how are we going back into the hill districts of this State where ambition is low, where work is plentiful, and where the life of the average farmer is hard and terms are poor? How are we going to get this thing started in these districts of the State where the necessity for it seems to be the greatest? I have studied over that phase of the problem a good deal. It is not a condition which is peculiar to Connecticut. In fact, it is true of every state. In Massachusetts, they have men who are employed to go around, doing extension work, endeavoring to show the farmers how they may improve their conditions in this line. They are spending money and employing men to go and try to work out on the farms just such problems as I have been talking about with you. We are sometimes asked why we do not get some of our work out into the State, why we ourselves do not get out into the State more, so as to give an object lesson to the farmers. We are told about Wisconsin. We sometimes hear it said, why do you not have two or three men that are recognized as good sensible men that can take some of

these farming problems in hand in our back towns, send them out and get them to work on those problems. Now, farmers, we would like to help you on this problem. The College is doing something. We go about the State and attend the institutes. We tell you what they are doing. If you will come to us, we will talk with you about their herds and about your rations, and do our best to show you how to get better rations for the least cost. We will see if we can pick out a good bull for you at fairly moderate prices. We would like to get out more than we do, because, as I say, we have often been asked why we did not send a man, perhaps, to a certain place to spend a day or two, or three days, and thus try in some systematic way to get the knowledge that we have about these problems into the minds of those who can make the best use of it. We are asked why we do not do that from the institution. Well, we cannot do it to any great extent because we have not got the money to pay the men with. The federal government gives us fifty thousand dollars for the teaching work at the College. If we could touch it, we could use some of that, but the law requires every cent of it to be devoted to the academic department. The Experiment Station is given a certain sum of money, something over fifteen thousand dollars, but that does not allow us to do work of this kind. We did two years ago start the testing of herds. We tested four herds. We did not go out into the poorer districts of the State because we did not succeed in picking out farms so we could do that with advantage. Of those that we did pick out, three of them were good herds and one was a poor herd. We had gotten along with the work when we received word that no more money could be used for extension work. All of the money they gave us had to be used for other purposes. That means that we do not have the funds with which to send men out. I leave it with you that it is barely possible that the State of Connecticut should invest a certain amount of money in this kind of work. I hope something may be done about it. The University of Illinois gets something like fifty thousand dollars a year from the state, and that, of course, they can use in any way. Massachusetts is doing this same work, and is furnishing money to do this extension work. I hope that the time is soon at hand when the State of Connecticut may appropriate a sum of money for that purpose, and so that we may go to the dairyman and the fruit

man and the poultry man, send them men expert in the work to carry the information that has been dug out by the men that have been successful to the farmer.

Now we have a Dairymen's Association, and also our State Board, as well as a large society devoted to the fruit interest. There is a possibility in the near future some scheme may be worked out whereby the State Board of Agriculture may encourage this kind of extension work among the farmers. The State Board of Agriculture in Maine, without costing it practically anything, has a man who is supervising the cow-testing associations. I do not know of any place where they are as rapidly weeding out the poor cows, and improving the dairy cows, and general dairy conditions, as they are in the state of Maine. They are doing a whole lot, and the farmers are paying that bill by putting three hundred dollar cows in the association. Thirty or forty men, each man paying a dollar a year per cow for the work done of weeding out the poor cows from the herds of that state. It is bound to result in a very great improvement.

Now I am going to stop because there is still considerable on the program, and I am going to leave this subject with this suggestion; that in order to do this work of improvement throughout the State, it might be wise for the State to appropriate money for that purpose, specially, or it might be wise, for the State Agricultural Society to take the matter in hand. Of course, anything that we can do at the College we will do. I may say this: I am at home. At any rate, I feel as if I was at home, because I was born just over the line. People here seem to be a good deal the same as the people over there. Some of us are willing to get up and hustle a little and do things. Some of us are handicapped so strongly that we are hardly able to push our way up. Those of us who have the will to do should help the man who is handicapped, and, so far as we are concerned, we will help all we can to push those men up. We are ready to do it, and I believe that the time is coming when we can do it, if not by 1910, certainly before very long. The dairy interests of the State must be improved, and we must do something to breed these cows up somewhere near the seven thousand pound mark.

I thank you.

The PRESIDENT. We have had two very excellent talks at this meeting on alfalfa. Now while we are all here, and before I introduce the next speaker, I want to ask the men in this audience that are raising alfalfa to raise their hands. I thank you. I see there are some. If I am alive the next year, I want to ask the same question. I hope there will be five times that number at the next convention that will raise their hands. I have been at it for some little time. I had my failures at the start, but anything that is worth doing, and that is worth anything, is worth striving hard to do. Anything that we can get without working for I would not give that for. I have had for two years on my farm two acres of alfalfa that have done well. Last year I had four acres, from which we cut four crops. One thing that has not been touched upon by these speakers was the ability of alfalfa to stand drouth. On one lot where we have that alfalfa this year, we would not get any more grass there than there is on this floor in August, but we had a splendid cutting of alfalfa, and as green as anything I ever saw out of doors. Now we have made plans to put in quite a good deal more. I feel so well satisfied with it today, that I am going to take the good Kentucky Colonel, who gave us such a good talk last night, over to see it, and I do not think that he will say I ought to be ashamed of it.

Now I said last night that we had an excellent corn exhibit in connection with this meeting which every man in this hall ought to feel proud of, and it is, to a very large degree, due to the instructions and the good work that the next speaker has done in the interest of corn breeding and corn raising in the State of Connecticut. I take great pleasure in presenting to you now Dr. E. H. Jenkins, whose subject is to be, "Every Farmer His Own Corn Breeder."

EVERY FARMER HIS OWN CORN BREEDER.

BY E. H. JENKINS.

The question which I wish now to discuss is: In what ways can the farmer, without special knowledge of the theory and practice of scientific breeding, or without time to put his knowledge of these things into practice, increase his yield of corn with profit? I assume that he is not looking for prizes at corn shows,

nor exceptionally high protein or fat content, nor even an unmixed clean single variety. He just wants more corn, the most corn he can get from an acre.

The size of any crop always depends on two sets of conditions. First, the externals or surroundings of the crop, such as light, heat, rainfall, fertilizers, tilth, etc., things which I shall not discuss here, and second, the inherent productive capacity of the seed which is planted. How to increase this capacity of the seed without undue cost is what I shall talk most about.

Let me illustrate what I mean by "inherent productive capacity." Doctor East, of our station, as well as many other observers, has often found that where two rows of the same variety of corn are planted side by side, each from the kernels of a single ear of a variety grown in the same field, and the two ears to all appearances exactly alike, the yields have been very different; for instance, the row planted from one of these ears yielded at the rate of seventy bushels per acre, while the yield from the other ear was only forty-five. Sometimes, too, a small, inferior looking ear has given a greater yield than a large, fair ear. Both had the same chance, but one had the power to use this chance much better than the other, while nothing that could be seen about the seed showed it. This is what I mean by greater inherent productive power.

Now, whether we raise fifty bushels of corn or one hundred per acre, our expenses of dressing and fitting the land, of planting and cultivating, are the same in either case, and the cost of harvesting, storing and selling is not very different. The weather conditions are the same. We may call then "fixed charges." With those things fixed, the yield and the profit or loss are determined by the inherent productive capacity of the seed we sow. To increase this producing power of our seed is to increase our crop without increased expenses.

How to originate new and better varieties than we now have in the shortest time and with least expense is a harder problem in the case of corn than in that of any other cultivated crop, because of the infinite number of crosses already made and the great difficulty of preventing constant accidental crossing.

The scientific study necessary to determine how various desirable characters are inherited and how transmitted by crossing varieties of corn is work for the experiment station and a specialist and has been carried on for some years at our station by Dr. East. His papers, printed in our bulletins and reports, contain some discussions not easily followed by any but an expert,

but they have made a valuable advance in the knowledge we need and contain many hints of present practical value.

I cannot miss this chance of saying, in passing, that the station is grateful to the farmers of this state for their willingness to let the station remain true to the objects for which it was founded:—that is, to quote the statute, “to promote agriculture by scientific investigation and experiment.”

Each year has witnessed some scientific investigation of which the immediate practical value was not clear to many. In each report there has been something of no immediate profit to the average reader. But my own belief is that in the end the practical farmer has got and will get as much cash return from this work as from the analysis of feeds or fertilizers and that the agriculture of the whole country will share in this return.

But while I believe that the introduction of new varieties of corn, better than what we now have is unlikely, till our knowledge of heredity as applied to corn breeding is greater, a great improvement of our present varieties is possible by selection. The most careful and systematic work in selection will, of course, be done by the men who make a business of it, who grow and sell corn for seed on a considerable scale and who are in a way professional corn breeders.

Some of our present varieties have been greatly improved by the care of those who grew them for years. A more rapid improvement will follow better knowledge of breeding and hybridizing and the efforts of those who have special aptitude and give their whole time to this branch of business. In our reports full directions have been given for carrying out this work in the best way by those who wish to undertake it.

But I am considering the man who is raising corn for his own use, not wholly or largely for sale as seed, and am asking what he can do to increase his corn crop by improving his seed.

First, seed corn should always be selected and marked in the field, before cutting. There alone you see the parent that bore it and the conditions about it. You will select stalks of medium height, with strong stems, good brace roots, broad healthy foliage and a well grown tassel and which bear good ears at a proper height from the ground, covered with a moderate thickness of husk, and which stand in and near perfect hills. The qualities of the mother we all understand are much more important than the looks of the offspring.

Here is a hill, for instance, with only one stalk;—the crows got the other two. It bears one large, well capped ear. But

this ear's superiority is, in part, perhaps wholly, due to the extra light and plant food which accident gave it, and not to its inherent, inherited excellence. But inherited excellence is the very thing we are after. The probability is that its kernels next year will give no larger yield than a smaller, less perfect looking ear from a full hill somewhere else. But this good looking ear any one would be likely to pick for seed if he made the selection in the winter or spring from his crib and only from the looks of the corn.

If corn in a prize exhibit is to be judged only by the size, shape and looks of the ear, with no conditions as to the way it was raised, the proper thing would be to plant a small plot with one stalk to the hill and hills four feet apart each way.

We have done that and got noble looking ears, with nearly twice as much shelled corn *per stalk* as from that which was planted at the proper distance. The reason was that each plant had all the light, air and fertilizer that it could use. Its ear, of course, was exceptionally large and perfect. With ordinary planting no stalk has this chance. We plant to get the most *per acre*. In this way we limit the possible yield of the single stalks.

Now, if you select from a stalk next a missing hill, because the ear is uncommonly large and fine, you are selecting because of merits, due perhaps wholly to accidents which are not merits that will be passed on to the next crop;—that is, “heritable” merit. Accidents are not inherited.

Reject, of course, all ears that have faults that you can see without husking. But this selection is chiefly concerned with the qualities of the mother plant and is very important, though only preliminary.

Don't take ears from a stalk with malformed or feeble tassel. The tassel gives as much of an indication of vigor, or the reverse, as the ear.

At cutting time gather all these selected stalks and stack them by themselves, with some other stalks to thatch them if you like. Go with the hired man for this. Don't send him alone. He will be sure to mess it.

Don't let anyone husk these selected ears but yourself. On your judgment and care now depends the size of your corn crop next year. If necessary, have the seed stack hauled to the barn, where you can be warm enough to use your head for judging seed, instead of for blowing on your fingers.

You will throw out now all ears that have real faults, such as

spaces between the rows and hybrid kernels, perhaps too those with uncapped tips, though that is often caused by the accident of incomplete pollination and not, therefore, likely to be heritable. You will save those which husk easily and have uniform, deep, wedgeshaped kernels with large chits or germs. Fancy shapes, colors, shape of the dents, etc., you will leave for those who engage in elaborate corn judging contests and who can perhaps give sound reasons for their choice. You are looking solely for seed that will give you the biggest crop of sound corn, and you don't care to make a selection for which you cannot give a good reason to yourself.

When this is done you have got seed, every ear of which came from a vigorous, well-developed mother, and shows the qualities which you want in next year's crop. You cannot go to your crib next spring and pick out such ears. And when you buy shelled seed corn by the bushel you know that it may have come from hundreds or thousands of plants, with as many various characters and producing capacities.

Whether you will husk the selected ears or leave a part of the husks on depends on how you will dry and cure it. The seed needs very different handling from the main crop. It should be separately and more carefully stored, out of the possible reach of vermin.

There are several good ways of curing seed corn and I do not need to describe them in detail. For instance, enough husks can be left turned back from the ear to braid them together in long strings, which can be hung in a dry cool place, out of danger of freezing till thoroughly cured. The husked ears may be laid on wire netting racks, or fastened singly on nails driven through a board, as has been described in our report. This last arrangement is shown in our exhibit down stairs.

But the essential thing is to have a free circulation of dry air all around the ear and so to dry out the corn thoroughly and rapidly, without any chance of sweating and molding.

Mild artificial heat is a good thing if you can have it. A quick dried corn is likely to germinate better than one slowly dried.

Mold easily starts where you don't see it and generally down in the germ which it kills or weakens. The damage may not show at all, but you will see it later, either in your test of vitality or, worse yet, in your field.

On the other hand, corn which has to be harvested while quite immature, if very carefully cured, may germinate well. Some

years ago a good ear of Stowell's Evergreen in prime eating condition was carefully cured at the station and yielded ninety-five per cent. of kernels which sprouted quickly and vigorously.

Crib-cured selections are much more likely to include ears damaged by sweating and molding than selections which have been handled as precious seed and not as so much cattle feed. Corn saved for seed cannot be too carefully watched, to prevent damage from molding. When husked it will contain from twenty-five to thirty-five per cent. of water. It is not safe from damage by mold till it has less than twelve, in my opinion.

When your seed corn has come through the winter in perfect condition, the next thing is to find whether the kernels of every ear are all alive and whether they will sprout promptly and vigorously. You cannot tell *certainly*,—and the key of success is to be certain, so far as certainty is possible,—unless you test each particular ear *by itself*.

The famous exhibit of Illinois seed corn at the St. Louis Exhibition was composed of ears which would not grow. The ears were sent there just because they were valueless as seed corn, although large in size and beautiful in appearance, and this was perfectly fair, for it showed all that the visitor could ask to see, the *looks* of good seed corn.

Now each ear is an individual, and it is safe to assume, where one variety has been grown by itself, that all its kernels are nearly alike in their vitality and crop-producing power.

Ten or twenty kernels taken from different parts of this ear will show about the same average vitality as the average of all the kernels on the ear. Ten, or better, twenty kernels taken from different parts of each ear will, therefore, give a fair test. If you lay your ears in a row and put these seeds taken from each ear in corresponding rows in your testing box, it is easy to keep run of them.

The testing seed should lie in damp sand, or clean sawdust, or in folds of damp woolen cloth, where they will have sufficient, but not excessive moisture, enough air, and a temperature of seventy-five to eighty degrees. Watch them and dampen them when necessary and count them in about three days from the time they are put in. Make a note of the number from each ear that sprout, and sprout vigorously, and take for seed only those ears from which at least nine-tenths of the kernels sprout quickly and vigorously. This is the final selection.

"But what is the use of all this monkey business?" says someone. "Fooling with seeds and wet sand and sprouts might amuse

the children, but I haven't got time to waste. I can tell whether corn will grow well enough by the looks of it." But I would answer such an objector: You have got hold of one good idea and two pieces of foolishness, which isn't so bad — taking us as we run on the average. Seed testing can be done by children when they have learned the trick and the importance of it and understand that it is real business. It is a kind of nature study and a better time and place and teacher of nature study than the common school. But it is not time wasted when you do it yourself, and you cannot tell whether corn will grow perfectly by looking at it.

The object of corn testing is to get as perfect a stand as possible in the field, to avoid those missing hills and missing stalks which cut down the yield, and those feeble, backward plants, which are little better than weeds. You will spend just as much for labor and fertilizers on a field with an imperfect stand as on a perfect one, and you will get less money for it. Every missing stalk is money out of pocket.

For instance, if you plant an eight-rowed flint, three and one-half feet each way and three stalks to the hill, it will take at the most about twenty-eight ears to plant an acre. From such a stand, let us suppose you get one hundred bushels of corn. Suppose four of those ears germinate only seventy per cent. You cut down your yield by nearly five bushels of corn and the equivalent of stover. At present prices, will not five bushels of corn pay for testing twenty-five or thirty ears? One of the speakers yesterday said his seed testing cost him nine cents an acre.

In some years the number of poor ears will be less than this and in some years a good deal more, and the point I make is that you cannot insure against a poor stand, except by *testing your corn before it is shelled*. After it has been shelled you can test its vitality, but if it is poor you can't do anything to help yourself, except by planting extra kernels and thinning out. You *can't separate the poor seed*. You can, if you test it before shelling.

The next point is to shell off the very small seed from the extreme tip and perhaps the large and misshaped seed from the butt, if you are going to use a machine planter. The use of this is to have your seed uniform in size, so that your planter will drop them uniformly. Then it will pay to test your machine plate on the barn floor, to see that the holes are right for your seed and, if they are not, make them right by filing. This is rainy day work long before planting time.

Then you can go into your field with some confidence that

you have done your part towards getting an even stand and a quick start for the crop. Without attending to these things you cannot fairly blame the crows and the weather for missing stalks and a short crop.

Now, does all this seem very simple and primary school talk for a man to give to corn growers of experience? It certainly looks rudimentary.

A man looks more like a business man when he is hauling a load of fertilizers or turning under a clover sod for his corn than when he is counting and testing kernels of corn or filing the plate of his planter. But of what use are clover sod and fertilizers under dead or weak seed? Why do we spend labor for that which satisfieth not? Toil and sweat as we will, the return we shall get from an acre of land and the work we spend on it depends after all on those ten or twenty ears of corn hanging in the seed house. The very beginning of farm wisdom is to have the very best possible seed.

I am urging attention to certain details which most of us understand, but which often do not get attention at the right time, because they are not showy and do not call themselves to our mind by their effects at just the time when they need this attention.

There is good reason to believe that, with such varieties of corn as we have, a general following of the practice above outlined would increase the average yield per acre of corn in this state by five bushels.

Now let us review what the farmer is gaining by the work I have suggested: In the first place, his seed testing and care in fitting his planter will make the stand of corn in his field as nearly perfect as accidents of the season will permit. Missing hills and missing stalks will not be his fault. This improvement affects only his next crop.

In the second place, he is using seed from those plants which show a distinct superiority to the average of his crop; as the breeder puts it, he is improving by the selection of "variations." This improvement is more lasting than the other. It sifts out from the variety undesirable strains, leaving the more productive. For there is not a variety we have that is not a mixture of many different inheritances, some good and some poor.

The experiments made in Illinois have shown that, by taking great care to limit the crossing of the selected corn with unselected plants, it is possible in a term of years to get corn which will be very much richer in protein or fat than the stock from which the start was made. A similar gain is possible in the total

yield of corn, if that is the quality for which the crop is bred. Of course, there is a natural unknown limit to this change, for we cannot get a corn that will be all protein or half protein.

Similar work with the sugar beet has increased the average percentage of sugar from less than six to perhaps sixteen per cent., with individual beets showing as high as twenty-eight per cent. Further than that breeders cannot go. It is the limit for sugar in beets.

The corn breeder too finds the limit set by nature to the yield from his seed selected by the ear-to-row method which has been described in our reports. The yearly gain in yield, which may be large at first, is much less in following years, till a further increase is impossible. With care it may be held where it is, but without continued care the corn, like the sugar-beet, will go back to its original average yield. This I think explains in part why seed corn bought from some breeders at the west is said to deteriorate in this state. Difference of climate, soil, etc., partly explains it, but in part also its change is because the seed selection is not made here with the care and skill which the breeder used, and it may soon be much mixed with inferior strains, for we all understand too that corn is the hardest of all our crops to keep true. It is constantly crossed with other types, varieties, or strains, and this is what makes the work of the breeder particularly hard.

The more permanent gain is only to be got by completely breeding out of a variety undesirable characters, or breeding into it some new character, and to do this with any certainty we need more knowledge of the laws of inheritance than we now have.

One thing more seems to me possible for a practical farmer to do to increase his corn yield and Dr. East's experience in the last few years has proved its value. We have in this state a considerable number of well-bred, fairly pure varieties of Flint, Dent and sweet corn. There is the Newgate Flint of Mr. F. B. Walker, of Granby, Mr. Stadtmueller, of Elmwood, has a Yellow Leaming, Mr. G. A. Hopson, of Wallingford, the Longfellow, the Hoyt, of New Canaan, an Early Mastodon, Mr. N. S. Brewer, of Hockanum, the Brewer Dent, Mr. C. S. Phelps, of Canaan, an Early Sharon, and so on.

The farmer himself may have, in very many cases does have, a variety which he has bred carefully and which gives fair return, but not so much as is perfectly satisfactory to him.

Dr. East has proposed and carried out very successfully on

a small scale for two years the following plan of hybridizing. It is based on the fact that a cross between two related but distinct and fairly pure strains of either animals or plants has been found in many cases to produce in the next generation an offspring having greater vigor and hence productive capacity than the offspring of in-breeding. He has proved it to be true of corn. It puts into the corn "new blood," as we say, not in helter-skelter fashion, but in a careful way. How or why it does it we do not know. We have got the fact ahead of the explanation.

The owner plants two well bred, distinct varieties of corn in alternate rows,—Longfellow and Sanford, let us say. A row of Longfellow, then one of Sanford, another of Longfellow and so on. A tenth of an acre may be enough, twice as much land as would give the seed he wanted if he were to use all the ears for seed. If the rest of the field is planted with either one or the other of these varieties, this breeding plot may be a part of his main corn field. It is all cultivated alike, but as soon as the tassels begin to show, he goes through this breeding plot and carefully pulls out the tassels from the alternate rows. If he grows Sanford for his main crop, he detassels all the rows of Longfellow corn. This variety must not be allowed to shed any pollen and so to fertilize its own silk. The ears on all the stalks of this variety must receive only pollen from the other variety, thus insuring a complete cross. The owner must go through the plot four or five times, perhaps, at intervals of a few days, and do the work *thoroughly*.

At cutting time he stacks separately the stalks from these detasseled rows, which will bear only ears certain to be a cross of the two distinct strains. This is the seed for next year's planting, to be cared for and tested as I have already described. He will also save, from a distant part of the field and with his usual care, some seed of the variety which he has formerly grown.

The next season he will plant the main crop from the cross got the year before and besides it some of his own variety for comparison, to note the increased yield from the cross. At the same time he will plant a breeding plot just as before, but at a distance from his main field, or protected from it by two or three rows of a tall ensilage corn which tassels too late to interfere by crossing on his seed plot. Thus, then, he gets each year a fresh crossed seed for next year's planting.

Last spring a number of corn growers in the state undertook this work and twelve or more report a successful cross and enough seed for testing the yield next year. We hope to have some of

these hybrids growing in our demonstration field next year, with the parent varieties next to them, so that those interested can see the results and judge for themselves of the value of the method.

More corn, more alfalfa, more clover, more manure and more humus in our soils; less boughten feed, less commercial fertilizer in consequence. These are the things to work for. These are the things we are getting.

The PRESIDENT. This closes our program. Our Secretary has worked hard to make this an interesting meeting, and to furnish you with a list of speakers to talk on subjects that would be of value to every farmer of the State. I think you will agree with me that he has succeeded well. You have attended in goodly numbers, and have given close attention to the speakers, and have been very respectful to your presiding officer, for all of which I thank you.

I now declare this mid-winter meeting of the State Board of Agriculture adjourned without day.

AGRICULTURAL FAIRS IN CONNECTICUT, 1909.

Delegate.	Name.	Place.	Date.	President.	Secretary.
E. E. Brown	New London County	Norwich	Sept. 6-7-8	E. J. Miner	T. W. Yerrington
B. C. Patterson	Windham County	Brooklyn	Sept. 7-8-9	H. H. Davenport	J. B. Stetson
G. A. Cosgrove	Beacon Valley	Naugatuck	Oct. 12	M. E. Bronson	J. P. Hogan
C. A. Thompson	Berlin	Berlin	Sept. 14-16	C. M. Jarvis	F. L. Wilcox
L. H. Healey	Conn. Fair Ass'n Inc.	Chart. Oak P'k	Sept. 6-11	Walter L. Goodwin	Hartford
L. H. Healey	Chester	Chester	Sept. 15	Dr. Theo. Foster	D. F. Hood
L. H. Healey	Clinton	Clinton	No fair	Dr. H. Wright	J. E. Bliss
C. A. Thompson	Colchester Grange	Colchester	Sept. 23	M. R. Abell	C. E. Staples
N. H. Brewer	Danbury	Danbury	Oct. 4-9	S. H. Rundle	G. M. Rundie
Geo. A. Barnes	Farmington Valley	Collinsville	Sept. 9-10	Geo. J. Case	E. A. Hough
J. B. Palmer	Greenfield Country Club	Granby	Sept.	Geo. O. Beach	Theodore G. Case
G. A. Cosgrove	Guilford	Greenfield Hill	Sept. 14-15-16	N. H. Sherwood	Mrs. D. B. Adams
B. C. Patterson	Harwinton	Guilford	Sept. 29	R. S. Parker	Rob't DeF. Bristol
N. H. Brewer	Lyme Grange	Hamington	Oct. 5	F. A. Cleaveland	D. K. Bentley
C. A. Thompson	Madison	Hamburg	Sept. 22	J. S. Daniels	J. Warren Stark
N. H. Brewer	New Haven Co. Hort. Soc.	N. Haven Mrs. H ¹	Sept. 23	Chas. L. Hinman	E. N. Willard
W. L. Davis	New Milford	New Milford	Nov. 2-4	John H. Murray	Fred H. Wirtz
Geo. A. Barnes	New London Co. Hort. Soc.	Norwich	Sept.	Noble E. Bennett	J. E. Hungerford
B. C. Patterson	Orange	Orange	June, Sep. Nov.	S. A. Gilbert	Frank R. Allen
W. L. Davis	Putnam Park Association	Putnam	Sept. 6-7	W. S. Woodruff	A. D. Clark
Wilson H. Lee	Rockville Fair Association	Rockville	Aug. 31, Sept. 1	M. R. Joy	E. M. Arnold
G. A. Cosgrove	Simsbury	Simsbury	Sept. 21-23	A. Kingsbury	F. J. Cooley
J. B. Palmer	Stafford Springs	Stafford Springs	Sept. 29-30	J. O. Phelps, Jr.	A. E. Lathrop
D. W. Patten	Union (Monroe, etc.)	Suffield	Sept. 28, 29, 30	W. H. Hall	C. F. Beckwith
L. H. Healey	Wallingford	Huntington	Oct. 12-13	O. L. Dart	I. P. Graham
D. W. Patten	Wethersfield	Broad Brook	No fair	Thos. Morrissey	Dr. Thos. F. Martin
Geo. A. Barnes	Woodstock	Wethersfield	Sept. 15	H. A. Middleton	Henry F. Fletcher
Wilson H. Lee	Conn. Horticultural Society	So. Woodstock	No fair	M. E. Cook	D. W. Ives
W. L. Davis	Conn. Dairymen's Ass'n	Wolcott	Sept. ?	A. H. Griswold	C. E. Adams
E. E. Brown	Conn. Pomological Society	Union H ¹ , H ¹ td	Sept. 13, 14, 15	Chas. A. Gates	Frank P. Fenton
D. W. Patten	Conn. Bee Keepers' Ass'n	Chart. Oak P'k	Oct. 13	W. A. Faber	L. H. Healey, N W
			Jan. 19-20 '10	J. F. Huss	E. P. Woodin
			About Oct. 1	Wilson H. Lee	Alex. Cummings, Jr.
			Sept. 6-11	C. S. Gold	J. G. Schwink, Jr.
				Allen Latham	H. C. C. Miles
					J. A. Smith

OFFICIAL LIST OF SOCIETIES, HOLDING FAIRS IN 1909.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	TREASURER.
Farmington Valley.	George J. Case.	E. A. Hough.	Benj. F. Case.
Union Agricultural Society of Bark-	Leon A. Coe.	Homer P. Deming.	Homer P. Deming.
hamstead, Colebrook & Hardland,	C. S. Gold.	H. C. Miles.	Orrin Gilbert.
Conn. Pom. Soc.	S. Alpheus Gilbert.	Frank H. Allen.	Frank H. Allen.
New London Co. Hort. Society.	Howard A. Middleton.	Henry F. Fletcher.	Charles A. Thompson.
Union.	W. H. Hall.	C. F. Beckwith.	Robert H. Fisk.
Stafford Springs.	John H. Murray.	Fred H. Wirtz.	David Kydd.
New Haven Co. Hort. Society.	John F. Huss.	George W. Smith.	W. W. Hunt.
Conn. Horticultural Society.	Frank A. Cleaveland.	D. K. Bently.	D. K. Bently.
Harwinton.	Theodore Foster.	Donald F. Hood.	Edgar W. Lewis.
Chester.	Chas. A. Gates.	Frank P. Fenton.	William L. Higgins.
Horseshoe Park.	Marshall E. Bronson.	John P. Hogan.	William T. Davis.
Beacon Valley.	Watson S. Woodruff.	Arthur D. Clark.	Edward L. Clark, Jr.
Orange.	Charles L. Hinman.	Edward N. Willard.	Edward N. Willard.
Madison.	Andrew Kingsbury.	F. J. Cooley.	Charles M. Squires.
Rockville Fair Ass'n.	R. S. Parker.	Thos. W. Yerrington.	W. C. White.
Guilford.	J. B. Palmer.	James A. Smith.	Charles W. Hill.
New London County.	Allen Latham.	C. E. Staples.	James A. Smith.
Conn. Bee Keepers Ass'n.	M. R. Abell.	J. G. Schwink, Jr.	Belle L. Strong.
Colchester Grange Corporation.	Wilson H. Lee.	Leland Gwatkins.	B. C. Patterson.
Conn. Dairymen's Association.	C. M. Jarvis.	A. E. Lathrop.	Frank L. Wilcox.
Berlin & Conn. State Agri. Soc.	J. O. Phelps, Jr.	Edgar B. Case.	Charles E. Curtiss.
Simsbury.	Geo. O. Beach.	A. C. Acker.	Henry G. Viets.
Graby.	N. H. Sherwood.	Leonard H. Healy.	Eli Wakeman.
Greenfield Country Club.	Clarence H. Child.	J. P. Graham.	Melancthon Riddick.
Woodstock.	O. L. Dart.	E. P. Woodin.	J. O. Haskins.
Wolcott.	W. A. Faber.	Walter L. Goodwin.	E. M. Upson.
Conn. Fair Ass'n.	Walter L. Goodwin.	E. M. Arnold.	Charles Soby.
Putnam Fair.	M. R. Joy.	Joseph B. Stetson.	Richard Gorman.
Windham County.	George S. Cary.		William R. Thurber.

RETURNS OF AGRICULTURAL SOCIETIES, 1909.—FINANCES.

SOCIETIES.	Cash on hand.	Single Admission Tickets.	Membership or Season Tickets.	Grand Stand.	Donations and Unclaimed Premiums.	Entrance Fees, Trials of Speed.	Other Entrance Fees.	Rent of Ground.	Other Sources.	State Appropriation.	TOTALS.
Farmington Valley,.....	\$6.43	\$319.20	.....	\$83.70	\$12.50	\$935.00	\$35.32	\$108.00	\$2,310.00	\$121.63	\$3,916.78
Union Agricultural Society of Barkhamsted,.....	177.58	.....	.....	.....	139.10	.....	.....	31.50	75.00	.....	245.60
Conn. Pom. Soc.,.....	67.52	36.60	451.00	.....	.....	.....	.....	.....	130.10	1,550.09	2,305.07
New London County Hort. Soc.,.....	899.62	.....	135.00	.....	.....	.....	.....	.....	.....	103.70	332.83
Union,.....	11.22	2,650.49	124.25	730.75	10.00	1,035.00	.....	85.50	140.24	127.32	1,142.68
Stafford Springs,.....	890.62	2,650.49	124.25	730.75	464.34	1,035.00	17.00	786.00	215.71	224.04	1,030.59
New Haven Co. Hort. Society,.....	380.25	295.60	97.00	.....	20.00	.....	.....	.....	.....	157.86	1,626.66
Conn. Horticultural Soc.,.....	171.47	293.90	.....	.....	2.95	.....	.....	.....	.....	103.94	578.81
Harwinton,.....	35.11	3.50	.....	.....	1.80	.....	35.75	496.75	56.00	122.79	742.15
Chester,.....	.....	123.75	24.25	.....	.....	.....	.....	11.00	94.00	113.22	367.02
Horseshoe Park,.....	5.74	2,104.65	86.00	494.25	.....	390.00	.....	537.00	584.00	208.39	4,420.03
Beacon Valley,.....	238.33	733.00	.....	.....	.....	97.50	10.00	161.00	151.14	.....	1,382.97
Orange,.....	940.71	2,763.95	149.25	279.75	.....	385.58	.....	274.00	177.53	.....	5,197.15
Madison,.....	5.35	59.34	53.53	.....	.....	.....	52.00	43.50	44.15	102.50	390.37
Rockville Fair Ass'n,.....	293.27	3,781.65	145.90	904.75	.....	582.50	139.29	743.00	195.50	251.68	7,037.54
Guilford,.....	487.60	340.83	138.00	.....	45.00	.....	24.00	.....	103.12	144.39	1,382.94
New London County,.....	2,005.33	4,129.60	155.00	777.75	.....	840.00	8.00	575.14	177.95	241.28	8,910.05
Conn. Bee Keepers' Ass'n,.....	21.50	34.05	43.50	.....	179.00	.....	9.00	.....	200.00	.....	453.00
Colchester Grange Corp.,.....	23.90	.....	392.00	.....	.....	.....	10.00	4.00	125.94	130.70	294.69
Conn. Dairyman's Ass'n,.....	744.11	5,641.75	714.25	638.15	40.00	770.00	.....	.....	154.15	2,381.20	2,861.34
Berlin and Conn. State Agri. Soc.,.....	.....	690.81	.....	150.55	155.85	1,011.37	213.00	863.24	3,048.50	442.15	13,115.15
Simsbury,.....	5.76	544.65	.....	134.85	.....	800.00	.....	90.50	1,336.23	153.94	3,698.25
Greenfield Country Club,.....	548.16	1,476.50	.....	110.05	85.00	.....	.....	135.00	58.15	113.22	1,781.63
Woodstock,.....	305.60	1,265.32	.....	223.44	.....	140.00	56.00	85.25	333.70	293.62	2,958.96
Suffield,.....	299.99	2,898.85	.....	334.10	.....	1,196.20	93.95	325.50	390.93	215.15	3,049.89
Wolcott,.....	3,356.01	433.60	77.00	6,204.75	50.00	.....	6.00	341.55	585.35	103.49	5,802.83
Conn. Fair Ass'n,.....	9,309.58	26,974.59	.....	384.30	24,750.00	4,587.00	3,021.50	5,850.33	203.88	141.30	97,340.37
Putnam Fair,.....	2.90	1,364.35	40.00	145.40	142.65	47.50	178.55	401.00	582.00	.....	3,321.35
Windham County,.....	.....	976.85	.....	.....	.....	.....	59.62	305.50	.....	135.75	1,747.63

RETURNS OF AGRICULTURAL SOCIETIES, 1909. — FINANCES, CONTINUED.

SOCIETIES.	Expenses of Fair.	Premiums for Speed.	Premiums for Amusement.	Other Premiums and Gratuities.	Permanent Improvements.	Other Expenses.	Cash on hand.	Total.	Indebtedness of Society.	Real Estate.	Personal Estate.	No. of Members.	No. of Stockholders.	Capital Stock.	Admission Tickets.	Season Tickets.	Grand Stand.
Union Valley	\$415.00	\$1,570.00	.....	15.15	.....	\$1,655.00	\$90.73	\$5,916.78	\$2,900.00	\$6,203.07	\$93.00	.....	80	\$5,000	\$25	.....	.....
Union Agri. Soc. of	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bark's and Cole-	80.85	.....	.....	.....	.....	.....	2.25	245.60	75.00	.....	.....	70	.....	.....	.....	.....	.....
brook and Hartl'd.	175.46	.....	\$1.75	389.15	.....	1,614.52	125.94	2,305.07	.....	.....	.....	615	.....	.....	.....	.....	.....
Conn. Pom. Soc.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New London Hort.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Society,	82.24	.....	.....	131.50	\$18.16	85.03	25.89	332.82	.....	.....	.....	125	.....	.....	.....	.....	.....
Union,	62.84	.....	10.00	226.60	.....	103.00	740.24	1,142.68	.....	.....	35.00	.....	.....	.....	25	.....	.....
Stafford Springs,	2,263.11	1,680.00	1,547.00	1,056.60	.....	.....	15.63	6,562.34	2,120.50	6,000.00	.....	.....	51	5,000	50	\$1, 1.50	\$25, 50
New Haven County	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hort. Society, ..	288.06	.....	.....	789.45	.....	243.44	305.07	1,626.66	60.00	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Hort. Soc.,	166.07	.....	.....	215.50	.....	.....	166.74	578.31	.....	750.00	990.00	148	.....	.....	10	.....	.....
Harwinton,	168.69	.....	114.50	336.80	.....	.....	132.16	742.15	.....	.....	150.00	.....	.....	.....	.....	.....	.....
Chester,	184.02	.....	.....	230.05	.....	23.76	.....	.....	70.81	.....	100.00	.....	.....	2,085	.....	.....	.....
Horseshoe Park, ..	216.40	1,410.00	728.00	718.70	353.71	878.01	115.21	4,430.03	.....	.....	4,124.11	49	49	.....	.....	1.00	.....
Beacon Valley, ..	538.09	320.00	131.65	246.80	.....	.....	166.43	1,392.97	.....	.....	25.00	37	.....	.....	.....	.....	.....
Orange,	849.76	1,025.00	435.00	842.00	.....	265.00	1,780.30	5,197.15	.....	.....	3,700.00	79	.....	.....	.....	.....	.....
Madison,	87.31	1,570.00	1,379.87	45.86	.....	400.00	436.62	7,037.54	2,800.00	12,000.00	75.00	45	.....	10,000	.....	1.00	.....
Rockville F. Ass'n,	1,975.15	.....	.....	1,275.90	.....	.....	511.25	1,282.94	.....	.....	.....	126	.....	.....	.....	.....	.....
Gulford,	372.39	.....	.....	392.20	7.00	.....	.....	.....	.....	.....	.....	244	.....	.....	.....	.....	.....
New London Co., ..	1,313.60	1,830.00	674.25	1,302.00	350.23	2,333.34	1,070.63	8,910.05	2,900.00	10,000.00	.....	175	.....	.....	.....	.....	.....
Conn. B. Keepers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ass'n, .....	.....	.....	.....	379.00	.....	53.11	21.89	453.00	200.00	.....	.....	155	.....	.....	.....	.....	.....
Colchester Grange	132.35	.....	.....	.....	.....	.....	41.64	294.69	1,000.00	3,000.00	100.00	.....	.....	.....	.....	.....	.....
Corp., .....	.....	.....	.....	120.70	.....	1,788.67	693.73	2,861.34	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Dairymen's	.....	.....	.....	385.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ass'n, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Berlin and Conn.	4,758.46	2,530.44	569.40	3,038.75	276.50	1,671.85	269.67	13,115.15	12,100.00	18,500.00	1,000.00	714	.....	.....	.....	1.00	.....
State Agri. Soc., ..	430.29	1,560.00	.....	926.24	34.50	3,698.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stimbury,	110.50	1,560.00	105.00	198.50	198.56	63.67	.....	2,293.23	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granby,	913.87	3,370.68	250.00	858.30	282.56	412.96	451.19	9,700.00	3,305.00	9,700.00	1,523.00	170	.....	.....	.....	.....	.....
Greenfield Co. Club	1,088.00	2,370.68	.....	871.85	.....	.....	287.64	3,049.98	8,000.00	8,000.00	1,710.00	406	.....	.....	.....	.....	.....
Woodstock,	4,824.37	9,375.00	857.20	245.05	811.34	1,052.78	985.16	5,800.53	1,020.00	7,000.00	.....	122	.....	.....	.....	.....	.....
Surfield,	394.15	.....	.....	416.00	30.00	.....	3,468.94	4,309.00	.....	.....	200.00	.....	.....	.....	.....	.....	.....
Wolcott, .....	.....	.....	.....	.....	.....	.....	172.30	97,340.37	3,455.39	169,100.00	7,148.15	77	.....	.....	.....	.....	.....
Conn. Fair Ass'n, ..	893.32	1,630.00	.....	11,982.82	4,004.61	19,998.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Putnam Fair, .....	.....	1,000.00	498.00	404.94	210.00	250.00	.....	.....	.....	10,000.00	.....	22	.....	.....	.....	.....	.....
Windham County, ..	393.53	242.50	193.50	937.90	120.24	163.55	3,291.25	2,050.62	303.10	3,000.00	100.00	550	.....	.....	.....	.....	.....

ANALYSIS OF PREMIUMS AND GRATUITIES PAID. — FARM STOCK.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Working Oxen.	Steers.	Fat Cattle.	Horses.	Horses, Speed.	Sheep.	Swine.	Poultry.	All other.	Total.
Farmington Valley.....	\$30.00	\$33.00	\$10.00	\$6.00	\$30.00	\$3.00	.....	\$11.00	\$1,370.00	.....	.....	.....	\$4.00	\$1,680.00
Union Agricultural Soc. of Bark-	4.50	7.00	4.00	2.75	8.00	6.00	.....	24.25	.....	.....	.....	\$14.00	1.50	80.00
Conn. Pomological Society.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New London Hort. Soc.,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union,.....	19.00	38.00	4.50	16.00	13.00	1.50	\$5.00	16.00	15.50	5.00	\$3.00	14.50	3.00	151.00
Stafford Springs.....	59.00	117.00	26.00	50.00	171.00	29.00	9.00	59.00	163.00	.....	.....	.....	59.00	2,389.00
New Haven County Hort. Society.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Horticultural Soc.,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harwinton.....	6.50	11.15	.75	1.75	55.00	21.50	1.00	17.25	.....	3.00	2.50	50.30	8.05	178.75
Chester.....	2.00	8.50	4.50	2.00	7.00	5.00	.....	5.25	.....	.....	.....	30.70	.....	65.45
Horseshoe Park.....	45.00	159.00	100.00	13.00	101.00	17.00	10.00	48.00	330.00	18.00	9.00	35.00	4.75	559.75
Beacon Valley.....	8.50	17.75	5.25	2.25	48.50	10.00	4.00	16.00	.....	.....	.....	37.85	.....	465.10
Orange.....	33.00	70.00	41.75	20.00	145.00	11.00	9.00	85.75	.....	2.00	19.00	34.00	19.00	498.50
Madison.....	1.25	5.25	1.25	3.25	14.00	.....	1.00	2.00	.....	.....	.....	20.11	.....	58.11
Rockville Fair Association.....	57.50	105.00	48.00	35.00	53.50	11.50	4.00	44.00	1,370.00	30.00	11.00	265.75	.....	2,331.25
Guilford.....	1.50	11.00	1.50	2.00	18.00	11.00	3.00	19.50	.....	.....	6.00	67.25	14.55	155.30
New London County.....	94.00	307.50	39.25	53.75	133.00	15.75	17.50	104.75	1,380.00	115.00	53.00	123.00	.....	2,890.50
Conn. Bee Keepers Ass'n.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colchester Grange Corporation...	2.00	6.25	3.75	1.90	5.25	3.50	1.50	9.00	.....	1.00	2.00	7.55	.....	43.30
Conn. Dairymen's Association...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Berlin & Conn. State Agri. Soc.,	231.00	277.00	61.00	42.00	240.00	23.00	15.00	87.00	2,351.15	398.50	12.00	375.00	290.00	4,362.65
Stimbury.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granby.....	20.00	30.00	18.00	7.00	15.00	14.00	.....	35.00	.....	11.00	.....	35.00	.....	175.00
Greenfield Country Club.....	13.25	22.00	15.75	9.25	.....	.....	.....	55.50	.....	6.75	6.00	46.50	143.25	454.75
Woodstock.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Suffield.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wolcott.....	22.00	45.50	21.25	20.00	63.00	11.00	2.50	30.00	.....	2.00	2.00	108.80	.....	108.80
Conn. Fair Ass'n.....	1,073.00	1,965.00	438.00	493.00	.....	.....	.....	2,335.00	16,360.00	1,198.00	740.00	55.00	26.25	270.50
Putnam Fair.....	.....	.....	.....	.....	.....	.....	.....	75.00	1,000.00	.....	.....	1,992.50	134.50	24,655.00
Windham County.....	30.00	73.00	84.00	30.00	135.00	50.00	.....	80.00	335.00	36.00	6.00	45.00	.....	1,118.50
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,684.00

ANALYSIS OF PREMIUMS AND GRATUITIES PAID.—CONTINUED. FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Buckwheat.	Grass Seeds.	Potatoes.	Carrots.	Beets.	Turnips.	Onions.	Other products.	Total amount for Grain and Root Crops.
Farmington Valley,.....	\$2.10					\$2.30			\$13.95	\$1.10	\$1.50		\$3.10	\$8.70	\$92.75
Union Agricultural Soc. of Burkhead's Colebrook and Hartland,	1.50								15.00	.50			.75	.75	18.50
Conn. Pomological Soc.,										.50	.50		.50	5.00	7.00
New London Hort. Soc.,	2.25	\$0.50	\$1.25		\$0.50		\$0.50		8.50	.50	.75		.75		15.50
Union,	18.00	1.00	2.50		1.00	14.25	1.00		74.00	1.75	2.25	\$0.50	7.00		130.25
Stafford Springs,.....															
New Haven Co. Hort. Society,.....										1.50		1.50			36.50
Conn. Hort. Soc.,															43.00
Harwinton,.....	3.20		.50		.50	1.30	1.30		6.25	1.50	2.00	.60	5.75	18.15	43.15
Cheshire,.....	7.50		.80			3.55		.80	6.06	1.55	1.45	.45	1.10	1.65	25.66
Horse Hoe Park Agri- cultural Association,	.50	.25	.95	\$0.25	.95	.50	.75		12.25		.95		.95	17.25	33.00
Beacon Valley,.....	2.00		1.75		1.25	1.00	1.00		4.25	.75	1.50		3.25	10.75	98.75
Madison,.....	22.25	.50	.75		.75	5.25		3.00	16.75	3.50	9.50	.75	8.00	102.15	180.50
Rockville Fair Ass'n.,	4.30		.50						8.00	1.00	1.00		1.95	10.85	59.20
Sulford,.....	6.25	1.00	2.00	1.50	2.00	19.00	1.50		68.75	1.75	2.25	.25	1.75	88.95	290.45
New London County,	8.75	1.75	.75			.75			12.75	.35	.35		2.00	92.65	51.20
Conn. B. Keepers Ass'n.,	3.25	2.25	2.25	2.25	2.75	4.25	2.25		10.75	2.50	3.25	1.75	4.25	54.25	100.50
Colechester Grange Corp.						.55					1.10	.25			
Conn. Dairymen's As- sociation,.....	1.95	.25	.65	.25	.25				1.00	.25			1.45	11.65	20.60
Berlin and Conn. State Agricultural Society,						3.25	1.50		22.00	2.75	3.00	.75	4.25	18.50	196.75
Simsbury,.....	61.25	1.75	2.25	1.25	2.00										54.50
Greenfield Country Cl'b,	6.90		.75		.75	9.50	.75		7.20	5.25	3.50	1.00	6.25	25.15	70.25
Woodstock,.....									14.25	1.75	1.00		1.75		75.90
Suifield,.....	78.00		1.50						9.25	1.25	1.00	.50	1.75		16.50
Voicott,.....	6.00	1.25			1.00	3.00			172.25	18.50	16.00	3.50	2.75	8.50	29.25
Conn. Fair Ass'n.,	115.25	.50	2.25	.50	5.50	23.50	3.50		12.00	2.00	1.50	2.00	2.00	7.45	492.00
Putnam Fair,.....						3.00			11.45	1.50	1.50	.75	1.75		32.85
Windham County,.....	4.50	.75	.75	.75	.75	.75	.75			1.50		1.00		48.50	81.45

ANALYSIS OF PREMIUMS AND GRATUITIES PAID.—CONTINUED. FARM PRODUCTS AND MISCELLANEOUS.

SOCIETIES.	Fruit.	Flowers.	Other Cult. Crops.	Butter.	Cheese.	Honey and Wax.	Bread and Cake.	Sugar, Syrup, Preserved Fruit.	Total Farm Products.	Agricultural Implements.	Mechanical Inventions.	Fine Arts and Fancy Articles.	Decorated Carts and Trains of Oxen.	Plowing at Exhibition.	Grange Exhibit.	Medals.	Diplomas.	Total Miscellaneous.
Farmington Valley.....	\$20.40	\$4.25	.....	\$2.00	.....	.....	\$4.50	\$10.50	\$74.40	.....	.....	\$30.75	.....	.....	.....	.....	.....	\$30.75
Union Agricultural Society.....	25.50	6.50	\$9.75	.....	.....	.....	.....	8.25	64.75	.....	.....	6.00	\$10.00	.....	.....	.....	.....	16.00
Union Agricultural Society of Hopedale.....	870.90	.....	.....	.....	\$1.25	.....	.....	.....	389.15	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut Pom. Society.....	1.50	113.00	.....	1.00	.....	.....	.....	.....	191.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
New London County Horticultural Society.....	11.00	8.25	13.00	1.00	.....	.....	.....	.....	45.30	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Agricultural Society.....	59.00	6.00	73.75	1.00	.....	.....	.....	.....	151.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stafford Springs.....	24.00	798.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Haven Hort. Soc.....	10.00	163.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Horticultural Soc.....	16.50	5.60	.....	.....	.....	.....	.....	.....	215.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren.....	14.30	13.75	15.00	.50	.....	.....	.....	.....	81.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cheshire.....	42.25	6.75	1.50	.....	.....	.....	.....	.....	94.05	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horseneigh Park.....	83.75	10.25	.....	4.75	.....	.....	.....	.....	67.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beacon Valley.....	81.25	5.50	.....	.75	.....	.....	.....	.....	58.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Madison.....	16.50	5.65	.....	.....	.....	.....	.....	.....	277.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rockville Fair Assn.....	93.50	74.50	.....	5.00	.....	.....	.....	.....	219.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gullord.....	17.30	10.25	13.25	8.00	.....	.....	.....	.....	103.90	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Bee Keepers Assn.....	28.25	19.75	.....	.....	.....	.....	.....	.....	162.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colchester Grange Corp.....	7.00	8.30	4.35	.75	.....	.....	.....	.....	870.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Dairyman's Assn.....	.....	.....	.....	.....	.....	.....	.....	.....	49.45	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beal's Conn. State Agricultural Society.....	212.50	119.00	180.50	41.00	.....	.....	.....	.....	775.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shelbury.....	12.00	.....	.....	.....	.....	.....	.....	.....	54.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield Country Club.....	78.20	31.50	.....	.....	.....	.....	.....	.....	109.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windsor.....	16.50	53.10	36.93	12.00	.....	.....	.....	.....	207.33	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windsor.....	16.75	7.25	.....	.....	.....	.....	.....	.....	130.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windsor Fair Association.....	831.25	128.50	283.00	2.50	.....	.....	.....	.....	30.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Punah Fair.....	87.00	82.75	.....	.....	.....	.....	.....	.....	1530.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windham County.....	53.00	24.60	45.00	4.50	5.50	1.75	24.40	11.00	169.75	.....	.....	.....	.....	.....	.....	.....	.....	.....

NUMBER OF ANIMALS EXHIBITED. — 1909.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Oxen (pairs).	Steers (pairs).	Fat Cattle.	Horses.	Horses — speed.	Sheep.	Pigs.	Poultry (coops).	All other Stock.
Farmington Valley.....	12	23	8	7	3	3	.....	12	.....	.....	.....	.....	.....
Union Agricultural Soc. of Barkhamsted, Colebrook and Hartland.....	8	5	7	4	6	3	.....	13	.....	25	.....	13	.....
Connecticut Pomological Society.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New London County Hort. Soc.....	6	15	2	10	5	1	.....	8	.....	6	.....	16	.....
Union.....	15	4	84	30	27	30	4	21	.....	11	.....	1	.....
Stafford Springs.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Haven County Horticultural Society.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut Horticultural Society.....	8	12	1	4	87	23	2	19	.....	14	.....	84	.....
Harwinton.....	3	10	5	4	.....	4	.....	4	.....	.....	.....	40	.....
Chester.....	18	42	40	20	80	10	4	21	.....	13	.....	.....	.....
Horseshoe Park Agricultural Association.....	5	8	5	5	22	10	3	10	.....	.....	.....	164	.....
Beacon Valley.....	18	64	24	11	65	5	6	29	.....	8	.....	71	.....
Orange.....	1	7	1	5	20	.....	1	3	.....	.....	.....	117	.....
Madison.....	28	109	39	28	32	19	6	19	.....	25	.....	456	.....
Rockville Fair Association.....	3	19	2	10	.....	.....	.....	21	.....	98	.....	100	.....
Gulford.....	30	179	27	36	75	15	16	35	.....	30	.....	288	.....
New London County.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut Bee Keepers Ass'n.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colchester Grange Corporation.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut Dairymen's Association.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Berlin and Conn. State Agri. Soc.,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simsbury.....	39	56	41	31	70	14	5	69	.....	66	.....	330	.....
Granby.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield Hill Country Club.....	10	12	10	5	57	.....	6	.....	.....	7	.....	270	.....
Woodstock.....	.....	100	.....	.....	.....	53	.....	53	.....	.....	.....	155	.....
Wolcott.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	206	.....
Wolcott.....	17	44	8	15	35	15	3	17	.....	2	.....	150	.....
Conna. Fair Ass'n.....	51	25	42	66	.....	.....	117	117	.....	150	.....	2,860	.....
Putnam.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windham County.....	17	46	54	23	45	50	.....	24	.....	43	.....	17	.....

AGRICULTURAL FAIRS IN CONNECTICUT.—1909.

SOCIETIES.	PLACE.	DATE.	ATTENDANCE.						
			Monday.	Tuesday.	Wednes- day.	Thursday.	Friday.	Saturday.	Total.
Farmington Valley.....	Collinsville.....	Sept. 23-25.....	....	....	....	900	500	500	1,900
Union Agricultural Society of Barkhamsted, Colebrook and Hartland.....	.....	Oct. 12.....	....	2,500	....	....	....	....	2,500
Conn. Pomological Society.....	Berlin.....	Sept. 14-17.....	....	....	....	....	....	....	750
New London County Hort. So.....	Norwich.....	June 23, Sept. 23.....	....	....	350	400	....	....	750
Union.....	Broad Brook.....	Sept. 15.....	....	....	2,000	....	....	....	2,000
Stafford Springs.....	Stafford Springs.....	Sept. 29, 30, Oct. 1.....	....	2,000	6,000	2,000	....	....	12,000
New Haven County Hort. Society.....	New Haven.....	Nov. 2-4.....	....	350	400	450	....	....	1,150
Connecticut Horticultural Society.....	Hartford.....	Sept. 23, 24, Nov. 3, 4.....	....	....	300	1,000	650	....	2,300
Harwinton.....	Harwinton.....	Oct. 5.....	....	12,000	....	....	....	....	12,000
Chester.....	Chester.....	Sept. 15.....	....	....	750	....	....	....	750
Horseshoe Park.....	Willimantic.....	Sept. 14-16.....	....	1,000	7,000	2,000	....	....	10,000
Beacon Valley.....	Naugatuck.....	Oct. 12.....	....	3,000	....	....	....	....	3,000
Orange.....	Orange.....	Sept. 6, 7.....	5,350	1,000	....	....	....	....	6,350
Madison.....	Madison.....	Sept. 23.....	....	2,000	7,000	1,500	....	....	1,500
Rockville Fair Association.....	Rockville.....	Sept. 21-23.....	....	....	7,000	2,000	....	....	12,000
Gulford.....	Gulford.....	Sept. 29.....	....	7,000	15,000	....	....	....	22,000
New London County.....	Norwich.....	Sept. 6-8.....	8,000	7,000	....	....	....	....	15,000
Conn. Bee Keepers Ass'n.....	Charter Oak Park.....	Sept. 6-11.....	....	....	....	....	150	....	500
Colchester Grange Corporation.....	Colchester.....	Sept. 23, 24.....	....	....	....	50	....	....	500
Conn. Dairymen's Ass'n.....	Hartford.....	Sept. 14-17.....	....	....	....	....	....	....	30,000
Berlin & Conn. State Agt. Soc.....	Berlin.....	Sept. 29, 30.....	5,000	10,000	10,000	5,000	....	....	30,000
Simsbury.....	Simsbury.....	Oct. 6, 7.....	....	....	800	2,500	....	....	3,300
Granby.....	Granby.....	Sept. 14-16.....	....	....	2,321	1,409	....	....	3,730
Greenfield Country Club.....	Greenfield Hill.....	Sept. 13-15.....	....	585	1,030	....	....	....	1,615
Woodstock.....	So. Woodstock.....	Sept. 13-15.....	....	2,300	7,900	500	....	....	10,700
Sunfield.....	Sunfield.....	Oct. 12-14.....	....	2,100	2,500	....	....	....	4,600
Wolcott.....	Wolcott.....	Oct. 13.....	....	....	9,500	....	....	....	9,500
Conn. Fair Association.....	Charter Oak Park.....	Sept. 6-11.....	....	....	....	....	....	....	2,500
Putnam Fair.....	Putnam.....	Aug. 31, Sept. 1, 2.....	....	300	2,000	1,053	....	....	3,353
Windham County.....	Brooklyn.....	Sept. 7-9.....	....	....	2,000	1,000	....	....	3,000

OFFICIAL DIRECTORY

OF THE

CONNECTICUT PATRONS OF HUSBANDRY

FOR 1910.

OFFICERS OF CONNECTICUT STATE GRANGE.

Master, L. H. HEALEY, No. Woodstock.
 Overseer, G. A. VINCENT, Kent.
 Lecturer, J. A. SHERWOOD, Easton.
 Steward, ARD WELTON, Plymouth.
 Assistant Steward, W. S. HINE, Derby.
 Chaplain, REV. G. F. GOODENOUGH, Northfield.
 Treasurer, N. S. PLATT, 395 Whalley ave., New Haven.
 Secretary, H. E. LOOMIS, Glastonbury.
 Gate-Keeper, F. M. CANDEE, Naugatuck.
 Ceres, MRS. A. L. POTTER, Woodstock.
 Pomona, MRS. A. C. HYDE, Brooklyn.
 Flora, MRS. U. E. AVERY, Ledyard.
 Lady Steward, Miss E. C. BURCH, Old Lyme.

EXECUTIVE COMMITTEE.

O. S. WOOD, Ellington,	Term expires	1911
J. H. HALE, South Glastonbury,	" "	1912
J. H. BLAKEMAN, Oronoque,	" "	1913
L. H. HEALEY, North Woodstock,	" "	1912
H. E. LOOMIS, Glastonbury,	" "	1912

FINANCE COMMITTEE.

G. WARREN DAVIS, Norwich, M. L. COLEMAN, Seymour,
 E. W. BIGLOW, Litchfield.

WOMAN'S WORK.

MRS. D. A. ST. JOHN, New Canaan.

PAST MASTERS' ASSOCIATION.

W. H. BARRON, Danielson, F. E. BLAKEMAN, Oronoque
 E. J. HEMPSTEAD, New London.

TAXATION.

J. NORRIS BARNES, Yalesville, L. M. REED, Union,
G. C. BECKWITH, Nepaug.

GENERAL DEPUTIES.

O. S. WOOD, Ellington, B. C. PATTERSON, Torrington,
J. H. HALE, South Glasonbury.

SPECIAL DEPUTIES.

W. H. BARRON, Danielson, GEO. A. HOPSON, Wallingford.

DEPUTIES FOR POMONA GRANGES.

Central Pomona, No. 1, { CHARLES T. DAVIS, Middletown,
ALLEN B. COOK, Farmington.
Quinebaug Pomona, No. 2, C. B. POMEROY, JR., Willimantic.
East Central Pomona, No. 3, { H. D. SIKES, Suffield,
C. W. BRADLEY, Rockville.
Mt. County Pomona, No. 4, T. GOODENOUGH, Winchester.
New Haven County Pomona, No. 5, W. H. BALDWIN, Cheshire.
New London County Pomona, No. 6, C. E. STAPLES, Colchester.
Excelsior Pomona, No. 7, W. L. PIERPON, Waterbury.
Seaview Pomona, No. 8, E. B. LYNDE, Chester.
Fairfield County Pomona, No. 9, F. E. BLAKEMAN, Oronoque.
Housatonic Valley Pomona, No. 10, H. W. TREAT, Bridgewater.

BOARD OF ARBITRATION.

Executive Committee, Overseer and Lecturer.

PATRONS' MUTUAL FIRE INSURANCE COMPANY.

President, HENRY E. LOOMIS, Glastonbury.
Vice-President, J. ARTHUR SHERWOOD, Easton.
Treasurer, O. S. WOOD, Ellington.
Secretary, H. C. DUNHAM, Middletown.

EXECUTIVE COMMITTEE.

PRESIDENT, SECRETARY, W. H. CARRIER, Glastonbury,
G. A. VINCENT, Kent, ANDREW KINGSBURY, Rockville.

ANNUAL MEETING.

Wednesday after second Tuesday in January.

JUVENILE DEPUTIES.

P. B. LIBLEY, Danielson, MRS. NELLIE C. CLEVELAND, Hampton.

OFFICERS OF THE GRANGES.

NAME.	MASTER.	LECTURER.	SECRETARY.
CENTRAL POMONA.			
1. Central Pomona.	Charles T. Davis, Middletown,	Mrs. L. W. Button, Rocky Hill,	J. H. Francis, Wallingford.
2. Quinebaug Pomona.	William H. Barron, Danielson,	Mrs. Annie M. Wheeler, Storrs,	Frank C. Lummis, Chaplin.
3. East Central Pomona.	Charles R. Risley, Silver Lane,	Mrs. Kate Carrier, Glastonbury,	Mrs. Laura J. Brewer, Glastonbury.
4. Mountain Co. Pomona.	Karl Kimbely, Torrington,	Lillian R. Norton, Torrington,	Arthur B. Ferry, Winsted.
5. New Haven Co. Pomona.	Walter H. Baldwin, Cheshire,	Frank N. Platt, Milford,	Flora E. Hough, Wallingford.
6. New London Co. Pomona.	Everett P. Barnes, R. F. D. 3, Norwich,	G. Warren Davis, R. F. D. 3, Norwich,	Otto L. Pelz, Lebanon.
7. Excelsior Pomona.	Jerome A. Downs, Bethany,	Mrs. Mabel F. Glaswold, Waterbury,	Mrs. Martha E. Judd, Southbury.
8. Sea View Pomona.	George B. Hall, Moodus,	Mrs. Katie F. Jewett, Lyme,	D. Eugene Smith, Madison.
9. Fairfield Co. Pomona.	Olin C. S. Shelton, Shelton,	Mrs. Edith W. Mitchell, Newtown,	Mrs. Nellie E. Blakeman, Oronoque.
10. Housatonic Valley Pomona.	James S. Chaffee, Amenia, N. Y.,	E. J. Chaffee, Amenia Union, N. Y.,	F. S. Peet, Kent.
SUBORDINATE GRANGES.			
11. Washington,	Frederic J. Ford, Washington Depot,	Richard E. Dodge, Washington,	C. W. McIlavey, Washington Depot.
12. Tunxis,	Walter M. Brown, Bloomfield,	Mrs. Annie M. Woodford, Bloomfield,	George Kellogg Marvin, Bloomfield.
13. Hope,	Herbert R. Leach, Litchfield,	William L. Benton, Torrington,	Mrs. Alice E. Loomis, Torrington.
14. Lebanon,	F. N. Taylor, Lebanon,	L. E. Livermore, Lebanon,	Mrs. Mercy E. Fuller, Lebanon.
15. Cheshire,	William T. Peters, Cheshire,	Mrs. Mabel A. French, Cheshire,	Frederick Doolittle, Cheshire.
16. Berlin,	George B. Carter, Berlin,	Mrs. Grace Ventres, Berlin,	W. H. Shumway, Berlin.
17. Union,	F. W. Prill, Plantsville,	Mrs. Bertha A. Heller, Southington,	A. S. Chaffee, Southington.
18. Glastonbury,	Frank Dixon, So. Glastonbury,	Mrs. Ida Lee Hale, So. Glastonbury,	Miss Lucy E. Miller, So. Glastonbury.
19. Meriden,	Arthur Sikes, Suffield,	George A. Austin, Suffield,	Mrs. E. F. Newton, Agawan, Mass.
20. Suffield,	Minor Ives, So. Meriden,	Mrs. Mary J. Ives, So. Meriden,	Mrs. Mabel A. Francis, Wallingford.
21. Wapping,	Julius Bratsnyder, Buckland,	W. W. Grant, Buckland,	Keeney B. Loomis, So. Manchester.
22. Manchester,	Arthur E. Loomis, So. Manchester,	Mrs. J. C. Thompson, So. Manchester,	Miss Adele F. Brush, West Cornwall.
23. No. Cornwall,	H. W. Andrews, Cornwall,	Benjamin Sedgwick, Falls Village,	Miss Flora E. Hough, Wallingford.
24. Wallingford,	J. Norris Barnes, Yalesville,	Mrs. Lillian Frisk, Yalesville,	Mrs. Annie Collins, Wapping.
25. Cawasa,	Oliver Case, Collinsville,	John Crowley, Collinsville,	Mrs. Annette E. Case, Canton.
26. No. Haven,	Myron Brackett, No. Haven,	Herbert Carlson, No. Haven,	Mrs. Ezra G. Munson, No. Haven.
27. Little River,	Ruben E. Peattie, Hampton,	Mrs. Mary W. Jewett, Hampton,	Mrs. A. M. Burnham, Hampton.
28. East Hartford,	Robert A. Hall, East Hartford,	Charles R. Risley, Silver Lane,	Miss Charlotte C. Smart, Silver Lane.
29. New Canaan,	Stephen Heath, New Canaan,	Miss B. L. Wakeman, New Canaan,	Leon C. Tucker, New Canaan.
30. Burrill,	Albert W. Vibberts, New Britain,	Mrs. Edith Horsfall, New Britain,	Mrs. F. H. Sharpe, New Britain.
31. Seneca,	William C. Child, Woodstock,	Chauncey S. Child, Woodstock,	Florence F. Wilcox, Woodstock.
32. Konomoc,	J. Frank L. Dow, Waterford,	Mrs. H. Hanney, Waterford,	Leonard B. Markham, Middletown.
33. Mattabesett,	Herbert L. Dow, Middletown,	Mrs. E. M. Congdon, Middletown,	Fred H. Lawton, Brooklyn.
34. Brooklyn,	Addie C. Hyde, Brooklyn,	Raymond Stone, Brooklyn,	Thomas A. Francis, Newington.
35. Newington,	E. O. Crawford, New Britain,	Henry Fields, Newington,	

OFFICERS OF THE GRANGES.—CONTINUED.

NAME.	MASTER.	LECTURER.	SECRETARY.
SUBORDINATE GRANGES — <i>Cont.</i>			
Harvinton, 45	C. B. Strong, Torrington.	Miss Gladys Rogers, Torrington.	Miss Eveline S. Barker, Torrington.
Bolton, 46	Frank B. Nangle, Rockville.	J. Wesson Phelps, Bolton.	John J. Oates, Rockville.
Bolton, 47	William C. White, Bolton.	Mrs. Cecelia Wilcox, Bolton.	Miss Adella N. Loomis, Bolton.
Whitville, 48	Edwin Matthews, Bristol.	Mrs. A. J. Birdseye, Farmington.	Mrs. Agnes L. Hanna, Bristol.
Farmington, 49	Allen B. Cook, Farmington.	Mrs. Lucy Gilbert, Middletown.	Miss Grace McKenney, Farmington.
Westfield, 50	Elihu H. Plam, Middletown.	Mrs. C. H. West, Rockville.	Mrs. Minnie C. Payne, Middletown.
Tolland, 51	David A. Brown, Tolland.	Miss Emma Blankenburg, Rockville.	James H. Clough, W. Willington.
Vernon, 52	Irving Campbell, Vernon.	Mrs. Mary P. Williams, Southington.	Miss Ethel Skinner, Rockville.
Plainville, 53	Percy A. Cowles, Plainville.	Mrs. Ethel C. Plumb, Stafford Springs.	Miss Florence A. Cowles, Plainville.
Stafford, 54	John M. Larned, Stafford Springs.	Robert W. Bingham, East Haddam.	Miss Isabelle E. Edson, Stafford.
East Haddam, 55	Edwin W. Crocker, Moodus.	Frank E. Korn, Durham.	S. E. Williams, Colchester.
Durham, 56	C. W. Coe, Northford.	Mrs. M. J. Burnham, West Hartford.	Miss Ruth M. Tucker, Durham.
West Hartford, 57	Frederic E. Duffy, West Hartford.	Mrs. Marion Chalker, Saybrook.	George B. Thayer, West Hartford.
Saybrook, 58	John S. Dickinson, Saybrook.	Mrs. Fannie M. Fuller, Abington.	Mrs. Ida H. McAllister, Saybrook.
Wolf Den, 59	Newell A. Badger, Abington.	Mrs. Anna Atwood, New Hartford.	Miss E. G. Grosvenor, Abington.
Eureka, 60	Gustavus C. Beckwith, New Hartford.	Miss Bertha R. Camp, Middlefield.	Bertha A. Burnham, Middlefield.
Middlefield, 61	Frederick Winter, Jr., Rockfall.	C. J. Grant, Storrs.	C. A. Wheeler, Storrs.
Quinnassett, 62	E. B. Pitts, Storrs.	Miss Mary J. Ross, Putnam.	Miss Sybil Pettit, Thompson.
Killingworth, 63	Everett E. Rhodes, Thompson.	Mrs. Hatie M. Davis, Clinton.	Lovel D. Parmelee, Clinton.
Cromwell, 64	Herbert C. Stevens, Clinton.	John F. Chalmers, Cromwell.	Miss Lottie M. Sage, Cromwell.
Natchaug, 65	Mrs. Ellen Jewell, Cromwell.	Clarence E. Chester, Chaplin.	Frank C. Lamms, Chaplin.
Stonington, 66	Don C. Hattin, Mansfield Center.	Mrs. Eva Kimball, Hampton.	C. Perry Simpson, Willimantic.
Stonington, 67	Luther B. Ashley, Hampton.	Rev. Geo. W. Clark, Canterbury.	Levi N. Clark, South Canterbury.
Mad River, 68	Hart W. Goff, South Canterbury.	George Clyne, Waterbury.	Mrs. Anna H. Pierpont, Waterbury.
Plymouth, 69	James R. Murdock, Waterbury.	Miss Marion Skilton, Torrington.	Miss Edith E. Sulliffe, Plymouth.
Indian River, 70	Richard W. Meers, Terryville.	Mrs. L. Tuttle, Milford.	George S. Clark, Milford.
Winchester, 71	Albert N. Beard, Milford.	Mrs. Bessie M. Bronson, Winchester.	Miss G. L. Goodenough, Winchester.
Coverly, 72	Arthur B. Johnson, Winsted.	Andrew Kingsbury, Rockville.	Miss Eliza E. Hall, Rockville.
Andover, 73	H. B. Pomeroy, Rockville.	Walter F. Ladd, Andover.	Mrs. Aurilla M. Snow, Andover.
Clinton, 74	Henry G. Phelps, Andover.	Frank E. Foote, Colchester.	Wm. H. Kealey, 2d, Clinton.
Colchester, 75	M. R. Abell, Colchester.	Miss Evelyn Perry, Stratford.	C. E. Staples, Colchester.
Housatonic, 76	Wm. I. Lobdell, Stratford.	Harry Vinings, Winsted.	Miss Alice M. Wilcoxson, Stratford.
Colerbrook, 77	James W. R. Allen, Winsted.	Walter S. W. Adams, Eastford.	Mrs. S. E. Northrop, Colerbrook.
Tolonet, 78	Elon H. Rose, Eastford.	Mrs. Honor E. G. Munroe, E. Haven.	Mrs. Alice B. Miller, Branford.
Foxon, 79	Ellsworth Thompson, East Haven.	Miss Mary Green, South Coventry.	Mrs. Sarah E. Bailey, East Haven.
Waugrambang, 80	F. A. Spaulding, South Coventry.		Miss Helen Potter, Willimantic.

OFFICERS OF THE GRANGES.—CONTINUED.

NAME.	MASTER.	LECTURER.	SECRETARY.
SUBORDINATE GRANGES.—Cont.			
Webutuck, 86.	Edw. K. Dean, Amenia Union, N. Y.,	Mrs. H. E. Northrop, Amenia U'n, N.Y.	Mrs. F. R. Randall, Amenia U'n, N.Y.
Hillstown, 87.	Harry J. Brewer, Glastonbury,	Chas. G. Strickland, So. Manchester,	Frederick W. Schaefer, Glastonbury.
Ekunk, 88.	Charles Barber, Moosup,	John Tanner, Moosup,	Mrs. Lottie S. Gallup, Moosup.
Asford, 89.	Alex M. Bassett, Warrenville,	Frank H. Bennette, Ashford,	Mrs. Addie S. Bassett, Warrenville.
Saymour, 90.	Luther G. Coburn, Seymour,	Miss Mary Hull, Seymour,	Mrs. Emma E. Francis, Seymour.
91.	Louis B. Beardsley, Stepney Depot,	John M. Burr, Stepney Depot,	William J. Nichols, Stepney Depot.
92.	Clifford L. Clinton, South Windham,		Mrs. Lillian M. French, Willimantic.
93.	F. M. Thompson, Warehouse Point,		J. S. Allen, East Windsor.
94.	Willis C. Terry, Norwich,	Lemuel Stoughton, Warehouse Point,	William A. Edmond, Griswold.
95.	Horace F. Wilder, Putnam,	Andrew J. Kennedy, Griswold,	Mrs. Ella W. Wood, Putnam.
96.	Mrs. A. C. Buckley, Amenia, N. Y.,	Miss Bessie Prindle, Sharon,	Mrs. Ella B. St. John, Sharon.
97.	L. M. Reed, Stafford Springs,	Nancy Howard, West Woodstock,	H. R. Howard, Stafford Springs.
98.	D. A. Doolittle, Westville,	Mrs. Clara Benson, Naugatuck,	F. M. Candee, Naugatuck.
99.	Clifford J. Parsons, Somers,	Mrs. Geo. F. Kibbe, Somers,	Mrs. C. W. W. Pease, Somers.
100.	Geo. F. Sanford, Litchfield,	Geo. H. Hunt, Litchfield,	F. L. Tharp, Litchfield.
101.	Charles A. Bond, Westville,	Thomas F. S. Bartlett, Westville,	Leroy C. Beecher, Westville.
102.	Henry Z. Royce, East Hampton,	Mrs. Eva Johnson, East Hampton,	Mrs. Ola West, East Hampton.
103.	Erva L. Barnes, Norwich,	Mrs. Erva L. Barnes, Norwich,	N. H. Hall, Norwich.
104.	Carrol W. Hutchinson, Gilead,	Rev. J. G. W. Herald, Gilead,	Martha Buell, Andover.
105.	Mrs. Carrie M. Day, Danielson,	Frank Bennett, Attawaugan,	P. B. Sibley, Danielson.
106.	J. B. Tillinghast, South Killingly,	Mrs. Mabel Phillips, South Killingly,	A. A. Tillinghast, South Killingly.
107.	S. Wayne Adams, Hartford,	Carrie L. Picard, Rocky Hill,	J. Elmer Bannon, Wethersfield.
108.	Frederick H. Bacon, Rocky Hill,	Mrs. Susie Burr, Bristol,	Winfield D. Honiss, Rocky Hill.
109.	Milo Leon Norton, Bristol,	Mrs. Arabella Beebe, Deep River,	Mary C. A. Perkins, Bristol.
110.	Chas. R. Marvin, Deep River,	Mrs. Mary M. Hopkins, Thomaston,	Mrs. Helen L. Stevens, Deep River.
111.	Charles S. Nearing, Northfield,	Charles H. Twine, East Morris,	Robert A. Kirchberger, Thomaston.
112.	Joel W. Skilton, Thomaston,	Mrs. Elizabeth Abbott, Watertown,	William F. Goodwin, Litchfield.
113.	Albert E. Johnson, Bethlehem,	Miss Edna Stannard, Westbrook,	Miss Elsie A. Lake, Watertown.
114.	A. F. Copeland, Thomaston,	Miss Ethel C. Burr, Higganum,	David C. Dibble, Westbrook.
115.	Horace E. Kelsey, Westbrook,	Mrs. I. Shultis, Falls Village,	M. G. Skinner, Higganum.
116.	W. W. Clark, Higganum,	Miss Louise Curtiss, Woodbury,	Miles L. Bledgett, Falls Village.
117.	Walter I. Kellogg, Falls Village,	Mrs. Bertha D. Bidwell, Glastonbury,	Arthur N. Skidget, Woodbury.
118.	Oscar Lathrop, Woodbury,	Arthur S. Crosby, Orange,	Harold B. Waldo, Glastonbury.
119.	Ansel E. Bidwell, Glastonbury,	Allison P. Smith, Newtown,	Miss Bessie P. Otis, Orange.
120.	Edward H. Newell, Orange,	Miss Mary E. MacDonald, Shelton,	Miss Hattie M. Northrop, Newtown.
121.	John J. Northrop, Newtown,		Mrs. E. C. Wooster, Shelton.
122.	D. P. Loverin, Shelton,		
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OFFICERS OF THE GRANGES.— CONCLUDED.

NAME.	MASTER.	LECTURER.	SECRETARY.
SUBORDINATE GRANGES.— <i>Cont.</i>			
131, Columbia,	George H. Champlin, Leonard's Br.,	William P. Johnson, Columbia,	Miss Amelia J. Fuller, Columbia.
132, Wichita,	Frank Voisard, New Preston,	Fred P. Johnson, Cornwall Bridge,	Miss Amy M. Hoffman, Cornwall Br.
133, Greenfield Hill,	Clarence H. Banks, Fairfield,	Miss Olive A. Pease, Fairfield,	D. Frank Brown, Fairfield.
134, Trumbull,	Dwight M. Fuller, Long Hill,	Mrs. Jennie Brinsmade, Trumbull,	Mrs. Ella Rogers, Bridgeport.
135, Silver Lake,	Arthur W. Lamb, Sharon,	Miss Emmeline Palmer, Sharon,	Miss Evelyn D. Scott, Sharon Valley.
136, East Canaan,	Jarvis C. Stevens, Canaan,	Miss Minnie E. Briggs, East Canaan,	Miss Clara M. Botum, East Canaan.
138, North Stonington,	E. Frank White, North Stonington,	Mrs. Edna H. Tryon, No. Stonington,	John L. York, North Stonington.
139, Middlebury,	John Carragon, Middlebury,	Miss Edith V. Beeman, Waterbury,	Albert W. Buell, Middlebury.
140, Plainfield,	P. W. Lewis, Plainfield,	Mrs. Edith M. Kennedy, Moosup,	Harold Lewis, Plainfield.
142, Rock Rimmon,	S. E. Cook, Beacon Falls,	C. B. Clark, Beacon Falls,	Mrs. Ella Roberts, Beacon Falls.
143, Goshen,	Harry H. North, Goshen,	Mrs. Charles Peck, Goshen,	Mrs. Edith Cook, Goshen.
144, Prospect,	William Bottomley, Naugatuck,	Mrs. Mabel Griswold, Waterbury,	Miss Florence Bottomley, Naugatuck.
145, Rippowam,	Cyrus Sables, Springdale,	Arthur I. Crandall, Stamford,	Mrs. Minnie Birdsall, Springdale.
146, Norfield,	Clarence Shipman, Norwalk,	Anna Hurlbutt, Westport,	Harry L. Waterbury, Norwalk.
147, Lyme,	Ray L. Harding, Lyme,	Mrs. Katie F. Jewett, North Lyme,	Mrs. Ellen H. Palmer, Lyme.
149, Easton,	Clarence A. Jennings, Bridgeport,	Florence C. Marsh, Bridgeport,	Willard S. Gillette, Long Hill.
150, Woodstock,	Samuel N. Brett, North Woodstock,	Miss Maud Healey, North Woodstock,	Charles M. Perrin, North Woodstock.
151, Enfield,	Walter E. Price, Warehouse Point,	Olin S. Olmsted, Hazardville,	Mrs. Ellen L. Killam, Thompsonville.
152, Cannon,	Henry Cooke, Georgetown,	Mrs. Arthur Little, Cannon Station,	Nelson S. Hurlbutt, Cannon Station.
153, Bridgewater,	William M. Curtis, New Milford,	Mrs. Mary B. Welton, Bridgewater,	Allen H. Treat, Bridgewater.
154, Kent,	Frank S. Peet, Kent,	Mrs. Annie B. Peet, Kent,	Chas. F. Kirke, Kent.
156, Danbury,	Edward S. Baldwin, Danbury,	Charles R. Curtis, Danbury,	Mrs. Jessie D. Ryder, Danbury.
157, East Lyme,	Earle Morgan, East Lyme,	Mrs. Myra Morgan, East Lyme,	Roy Kelly, East Lyme.
158, Chester,	G. Myron Abbey, Chester,	Mrs. Hattie G. Smith, Chester,	W. P. Holden, Chester.
159, Salisbury,	Hezekiah Goodwin, Falls Village,	Mrs. Mary J. Reed, Salisbury,	Wm. E. Petrice, Salisbury.
160, Aspetuck Valley,	George N. Abbott, New Milford,	Anna M. Hendrix, New Milford,	William R. Benedict, Northville.
161, Bozrah,	E. Judson Miner, Fitchville,	Miss Alice A. Bishop, Norwich,	Mrs. Charles J. Abell, Norwich.
162, Old Lyme,	George Griswold, Lyme,	Thomas Brown, Black Hall,	Miss Mayste Scollon, Lyme.
163, Redding,	Lonie C. Rumsey, Redding Ridge,	Albert A. Gorham, Redding Ridge,	Mrs. Olivia Sanford, Redding Ridge.
164, Bethel,	James E. Gallagher, Bethel,	Harold S. Davis, Bethel,	Willis B. Judd, Bethel.
165, Bridgetield,	Caro H. Northrop, Bridgetield,	Mrs. Helen Bowles, Bridgetield,	Arthur W. Northrop, Bridgetield.
166, Salem,	Benj. W. Jenkins, Colchester,	Mrs. Lizzie Colver, Colchester,	H. A. Rathbun, Colchester.
167, Ledyard,	William I. Allen, Mystic,	Mrs. Mary A. Darling, Groton,	Mrs. Fannie L. Clark, Norwich.
168, Stonington,	Arthur G. Wheeler, Stonington,	Albert T. Mitten, Stonington,	Mrs. Josie A. Wheeler, Stonington.
169, Riverton,	Wm. L. Parsons, Riverton,	Carlton S. Roberts, Riverton,	Miss Ruth Rowley, Riverton.
170, Wemansia,	Charles H. Evans, Gaylordsville,	Miss Bessie Soule, Gaylordsville,	Josie M. Hungerford, Gaylordsville.
171, Mystic,	Jesse B. Stinson, Mystic,	Miss Lizzie F. Wilcox, Mystic,	Miss Bessie W. Heath, Mystic.
172, Norwich,	Andrew B. Davies, Norwich,	Mrs. Maud E. Bliss, Norwich,	Mrs. Nettie B. Fanning, Norwich.
173, Wolcott,	Wilfred V. Warner, Waterbury,	Mrs. Bessie Woodin, Waterbury,	Mrs. Mary E. Coe, Waterbury.
174, Torrington,	Edson G. Davis, Torrington,	Mrs. Edith S. Many, Torrington,	Mrs. Emeline B. Hopkins, Torrington.
175, Lake Valley,	Nelson T. Hungerford,	Mrs. Maud Giddings,	Mamie E. Gray, Sherman.
176, Groton,	Irving E. Crouch, Groton,	Miss Amanda Allen, Groton.	Charles L. Gates, Groton.

REPORT OF THE TREASURER.

CHAS. A. THOMPSON *in account with*

STATE BOARD OF AGRICULTURE.

1908.		Dr.	Cr.
July	1. Balance amount in treasury,	\$180.65	
"	15. Wilson H. Lee,		\$11.00
Aug.	5. J. M. Trueman,		1.95
Sept.	14. Chas. F. Roberts,		100.00
Nov.	7. Wilson H. Lee,		46.50
"	" B. C. Patterson,		30.96
"	24. Ed. Halladay,		44.96
"	28. Case, Lockwood & Brainard Co.,		44.65
Dec.	8. To railroad fares,		100.00
"	10. Mrs. Ida G. Moulton,		15.50
"	" I. C. Fanton,		31.50
"	11. J. H. Bowker & Co.,		25.00
"	" James F. Brown,		5.75
"	12. D. Walter Patten,		14.90
"	" Winthrop Hotel,		157.10
"	" W. C. Knipper,		46.00
"	" W. H. A. Maynard,		5.00
"	" W. E. Britton,		11.85
"	18. Jas. E. Wing,		93.25
"	" Dr. C. D. Smead,		79.90
"	" E. P. Mayo,		42.50
"	" Wilson H. Lee,		2.80
"	" H. C. Morrison,		43.64
"	19. By State appropriation,	1,500.00	
"	" H. N. Loomis,		13.80
"	" Durham Press,		6.75
"	" L. H. Healey,		21.54
"	" The Blatchley Co.,		15.00
"	" L. A. Clinton,		3.60
"	" Railroad fares,		19.73
"	23. Meriden Morning Record,		18.00
"	" Journal Publishing Co.,		6.00
"	" The Penny Press,		12.00
"	" Chronicle Printing Co.,		5.50

1909.			
Jan.	9.	James F. Brown,	711.25
"	"	I. C. Fanton,	17.80
"	12.	State appropriation,	500.00
"	"	James F. Brown,	4.50
"	"	Seaman Mead,	11.20
"	"	Hartford Times,	13.44
"	"	J. B. Palmer,	22.90
"	"	Chas. A. Thompson,	40.75
"	"	D. S. Kelsey,	11.35
"	14.	N. H. Brewer,	15.00
"	"	W. P. Johnson,	10.00
"	"	Chas. E. Chapman,	5.00
"	"	O. R. Driggs,	10.00
"	"	E. E. Burnell,	5.00
"	"	S. R. Bronson,	2.50
"	"	Chas. S. Phelps,	10.00
"	"	W. L. Davis,	17.68
"	"	The Tribune,	5.00
"	"	New Britain Record,	3.00
"	"	Weekly Gazette,	8.00
"	"	Northampton Valley Pub. Co.,	3.00
"	"	D. W. Patten,	4.50
"	"	H. L. Garrigus,	2.60
"	"	Bristol Press Pub. Co.,	5.00
"	"	Chas. F. Bushnell,	1.50
"	"	A. F. Hawes,	3.95
"	29.	J. M. Trueman,	8.80
Feb.	3.	Windsor Locks Journal,	3.50
"	"	Shore Line Times,	12.00
April	17.	Wilson H. Lee,	7.10
"	"	F. H. Stoneburn,	2.75
"	"	Journal Publishing Co.,	18.00
"	"	C. D. Jarvis,	5.40
"	"	Mrs. C. A. Wheeler,	7.10
"	"	H. L. Hamilton,	9.35
"	"	F. H. Stadtmueller,	15.03
"	"	J. B. Stewart,	1.60
"	"	D. W. Patten,	4.50
"	22.	J. M. Trueman,	11.30
"	"	E. H. Jenkins,	10.75
"	"	L. H. Healey,	17.20
"	"	W. E. Britton,	3.65
"	"	F. H. Stadtmueller,	5.61
"	"	J. B. Palmer,	14.10
May	3.	Windham County Observer,	4.00
"	18.	Maud K. Wheeler,	6.95

June 14.	B. C. Patterson,	.	.	.	.	24.50
" "	L. A. Clinton,	.	.	.	.	11.65
" "	F. H. Stoneburn,	.	.	.	.	10.65
" "	Geo. H. Lamson, Jr.,	.	.	.	.	3.64
" "	Mrs. C. A. Wheeler,	.	.	.	.	2.50
" 19.	Dr. E. H. Jenkins,	.	.	.	.	7.50
" "	E. E. Brown,	.	.	.	.	31.95
" "	State appropriation,	.	.	.	1,000.00	
" 20.	Ed. Halladay,	.	.	.	.	34.65
" 29.	Thos. L. Brown,	.	.	.	.	5.00
" 30.	Seaman Mead,	.	.	.	.	15.30
" "	D. W. Patten,	.	.	.	.	16.30
" "	Chas. A. Thompson,	.	.	.	.	45.29
" "	J. B. Palmer,	.	.	.	.	20.35
" "	James F. Brown,	.	.	.	.	693.80
" "	L. H. Healey,	.	.	.	.	21.14
" "	I. C. Fanton,	.	.	.	.	50.75
	Deficit,	.	.	.	.	4.65

\$3,185.30 \$3,185.30

Above accounts found correct and approved July 1, 1909.

J. B. PALMER,	}	<i>Auditors.</i>
D. W. PATTEN,		
GEO. A. BARNES,		

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